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STEEL

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WHEN A B
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STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

As the Editor Views The News

■ STEEL buying tends to balance production. Last week (p. 25) production was at the rate of 62.5 per cent of ingot capacity, unchanged from the week previous. Many consumers have reduced inventories (p. 81) and are entering the market for the first time in several months. Activity is greater in a number of directions. Building construction is expanding. Pipe demand in the South is up sharply. Foundry operations have improved. Automobile production continues at a high level. Export demand is heaviest since the war started, is strongest in bars, sheets, semi-finished and tin plate. Included are special alloy bars apparently for military purposes.

• • •

45,000,000 Tons of Ore

Large machine tool builder has undertaken a novel educational system. It is based on a knowledge that a successful man must deliver all he has—and that is never more than enough. It is motivated by the fact (p. 22) that the average young college man of today feels that someone owes him something and that nothing should be required from him beyond a fair day's work. . . Barring unforeseen developments, observers estimate (p. 21) lake iron ore shipments this year will be around 45,000,000 tons, same as last year. Pressure to move coal up the lakes may result in early commissioning of vessels. . . Exports of air conditioning equipment (p. 39) increased 27 per cent in 1939.

• • •

Probe Trade Barriers

Canada continues to mobilize industrially for war. It is estimated (p. 23) that war orders in that country will come to one billion dollars during the first year of the war. . . Interstate trade barriers aimed at restricting "imports" from neighboring states were discussed before the temporary national economic committee (p. 31) last week. The desire for face-saving continues to block remedial action in the case of the national labor relations board. . . "Automatic farming" is making progress (p. 39) in Illinois. . . A new coach-sleeper (p.39) is expected to increase railroad passenger revenue. . . Steel is plated with copper (p. 36) by a new method which does not require electrical current.

• • •

Welded Submarines

Many engineers will be surprised to learn that the properties of malleable iron may be varied to meet many different requirements. This is possible (p. 44) through regulating heat treatment so as to obtain any desired combined-carbon content. . . . New York's new municipal airport is notable (p. 48) for its extensive use of stainless steel; building parts and decorations consumed 200,000 pounds. . . . Submarines of welded construction, using low-alloy high-strength steel (p. 68), have 30 per cent greater diving depth and other advantages. . . . Applied psychology is proving useful (p. 61) in controlling workers in the best interest of employer and employe.

• • •

Fuel Costs Reduced

Numerous recommendations concerning standardization and research, as well as changes in specifications and test methods, have been approved (p. 53) by committees of the American Society for Testing Materials. Many materials and procedures are involved. . . . Fuel costs have been reduced at an Eastern steel plant (p.62) by operating waste-heat boilers on the exhaust of heavy-duty engines using blast-furnace gas. . . . Blisters in porcelain enamel coatings on cast iron (p. 66) are found to result from coarse graphite and nonmetallic inclusions and porosity. . . . A routing system permits economies and operating advantages (p. 50) in assembling machine tools.

E C Kreutzberg

How to Save Money on Steel

Reduced shop labor costs . . . Elimination of heat treating failures, costly testing and re-treating... less clerical expense —these are money-saving advantages regularly reported by manufacturers who standardize on Ryerson Certified Steels.

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RYERSON CERTIFIED STEELS

RYERSON

Pre-Season Estimates Point to 45,000,000-Ton Ore Movement

Shippers note many unknowns that may cause revisions up or down. Coal accumulating at lower lake ports may expedite season's opening. Railroad applies embargo

■ ANTICIPATED demand for iron ore, necessitating early commissioning of Great Lakes ore fleet, has not materialized, does not seem immediately probable. Sufficient to maintain current steelmaking rate well into early summer, lower lake dock and furnace iron ore supplies are comfortably larger than had been expected last fall.

Consensus in the industry is that between 40,000,000 and 50,000,000 gross tons of iron ore will be moved, with most estimates closely pegged to last year's 45,547,974 gross tons. These estimates are predicated on belief European belligerent nations will not greatly increase iron and steel imports from United States, even though the war may assume more active status.

Some authorities, however, believe development of South and Latin American markets, together with neutral European and domestic demands, may more than offset the expected but not realized increase in French and British steel imports.

Only reason for movement of more than 50,000,000 gross tons this year, it is said, would be entrance of United States into war. Under those circumstances estimates as to volume of ore required would have to be revised sharply upward. No expectation of such action, however, was voiced.

Nevertheless, all estimates are provisional, with steelmen emphasizing prevalent abnormal conditions and extreme uncertainty as to immediate and more distant future. Peace declaration in Europe, it is felt, would result in quickly curtailed production.

Stocks totaling 25,966,874 gross tons as of March 1 were estimated by Lake Superior Iron Ore association. This compares with average of 29,511,979 gross tons on hand March 1 from 1929-1939 inclusive. Last year stocks totaled 28,840,053 gross tons. Highest since 1928 was 37,158,401 in 1938; lowest, 20,005,416 March 1, 1929.

Present conditions indicate tonnage on hand at lower lake points May 1 will total approximately 17,000,000 gross tons, considered ample for normal demand. This compares with estimated 23,000,000 gross tons year previous, 33,500,000 May 1, 1938, and 14,500,000 on that date in 1937.

February iron ore consumption was 4,241,839 gross tons, compared

■ **Scenes such as this were typical at lower lake ports last week as more than 20,000 cars of bituminous coal destined for upper lake ports accumulated. Placing of $1 per car per day demurrage charge by Baltimore & Ohio railroad, and possibly by other lines, may result in earlier opening of shipping season than ore demand requires**

to 5,289,308 in January and 2,852,540 in February a year ago. Total 1940 consumption to March 1 was 9,531,147 gross tons, against 5,779,246 in corresponding 1938 period.

Possible shortage of certain special analysis ores may require outfitting a few carriers about April 15, although bulk of the fleet is not expected to swing into operation immediately after. Ice conditions at Whitefish Bay, St. Mary's river and the Straits are favorable for early navigation, Soo locks are being prepared to open April 1, but Eastern Lake Erie ports may be considerably hampered by drift ice.

Interlake ore navigation last year opened April 30; April 13 in 1938 and April 15 in 1937.

Accumulation of more than 20,000 carloads of bituminous coal at the lower lake front may expedite opening of the shipping season considerably. With 1000 additional carloads arriving daily, and with demurrage charges of $1 per car per day already applied by Baltimore & Ohio railroad and other lines likely to follow suit, shipping may start earlier than demand for ore would require.

Number of American Great Lakes ore vessels has decreased to 298, with several sales to Canadian interests reported and others pending approval by United States maritime commission. Interlake Steamship Co. is reported to have sold its VICTORY to G. A. Campbell, Toronto, Ont., and Pittsburgh Steamship Co. has pending sale of its BRYN MAWR, a barge, and its H. L. SHAW.

Nearly 200 carriers are expected to be put in commission early in the season, with the year's total reaching about 250. Last year maximum was 287, in October; year previous, 154, also in October.

Tool Operator-Training Program To Ease Skilled Labor Shortage

■ PROGRAM for practical instruction of machine tool operators, particularly turret lathe operators, which is being undertaken by Warner & Swasey Co., Cleveland, was explained before the American Society of Tool Engineers, New York, March 8, by Clifford S. Stilwell, vice president of the company.

"We believe," said Mr. Stilwell, "that with the rapid rise in employment in the metalworking shops, the present serious lack of skilled machine operators can to some degree be reduced by this effort on our part at specific training of the men concerned with our product.

"It is our plan to present this as a form of education in some cases, and in others to co-ordinate our efforts in a variety of ways with operator training plans now being developed in various parts of the country, especially in connection with the aircraft industry.

"We expect to send into the field a group of young engineers who will present the general scheme and then develop it for effective use in any one of several different ways. Through this effort, we are hoping to contribute a service to industry which will be of benefit not only to operators, but also to tool engineers."

Mr. Stilwell presented an outline of what he considered the industrial requirements in tool engineering education.

"The tool engineer must approach his task with a sound conception of his opportunity as an individual. The worldwide conflict of social philosophies has so confused our thought that it has had a very definite effect on the efficiency of performance of all of us as individuals. The tool engineer is promoting all of the elements of a mechanized civilization and if he is to follow this career he must certainly be convinced of the validity of his objective.

"I am definitely impressed that as young men seek positions in industry either as graduates of universities or from technical high schools they present themselves in an attitude of mind which is a definite handicap to their progress. They seem to feel that they are somehow victims of a system; that beyond some reasonable initiative on their part, their problem properly falls on the shoulders of the community and that their welfare will inevitably be provided. Altogether too many students flood from our schools and colleges convinced that someone owes them something. What we need is more people obsessed with a purpose to serve and not be served.

"One of the greatest tragedies to my mind in our current political philosophy is an implied paternalism which suggests a man deliver a fair day's effort and that nothing more is required of him. The competitive system which commands success requires that a man deliver all he has and that is never more than enough. No engineering law is any sounder than that the value of results depends upon the volume and quality of production, whether man or machine.

"The next element in the makeup of our tool engineer which seems to me of prime importance is that education deal specifically with the development of his imagination. He is in a real sense a creator and a creator needs an imagination.

"Lack of imagination is one of the great handicaps which management encounters constantly in organization and particularly in all the branches of engineering in an engineering business, design, production and sales.

"As we progress in engineering methods, it is important that the engineer increasingly apply himself to the idea of lower cost and greater production with new combinations created of thoroughly established fundamental methods.

"The next element of education which it seems to me up to this point has been successfully emphasized is the subject of vocational guidance, beginning, perhaps, with the formative high school years and continuing constantly and persistently through the university.

"As a part of the general subject of vocational guidance, there is a good deal of value in cultivating more contact with business during the school years.

"I believe that education ought to give a better rating to personality. Granted, of course, some other fundamentals of intelligence, there is to my mind no single qualification for engineering or tool engineering or any other form of active life so important as personality.

Practical Training Effective

"Finally, as we look at this prospective tool engineer, comes the element of practical training . . . The industrial trade school and the technical high school have accomplished much and in a few of our colleges the so-called co-operative system of halftime practical shop life against halftime in the school room is decidedly effective.

"There is much to be desired in the dignifying of labor. From the point of management, I believe there is a growing recognition that in all departments of production the highest type of leadership and ability must be recruited and I am almost willing to predict that in the next several years the opportunities both in latitude and in earning power in the manufacturing end of industry will equal those of any other branch of the business excepting top management. The growing complexity of human relationships in industry will do much to increase the opportunity for the man in overalls."

Expect $750,000,000 War Orders To Be Placed in Canada by Sept. 1

TORONTO, ONT.

■ WAR contracts totaling $142,573,838 have been placed by the Canadian war supply board since the middle of July last year, according to a summary issued by the board. In January contracts totaled $29,566,181 and in February, $51,038,070. On a single day, Feb. 7, 68 contracts totaling $17,114,790 were let.

Board's summary of contracts covers all articles necessary for the three fighting services, except weapons, and for the commissary and headquarters organizations throughout the dominion. Contracts for $4.05 worth of brass pins are listed beside such items as $906,000 on payment for fleet of Westland-Lysander army co-operation aircraft.

Motor transport figured heavily in the contracts. Orders included trucks, automobiles, tractors and gasoline. Aviation contracts include air base construction, aircraft, spare parts, repair kits, bomb sights and practice bombs.

Meanwhile, both the British and Canadian governments continue to place large war contracts with Canadian companies and it is now believed that the first year of the war will witness expenditure of more than a billion dollars. This would indicate about $750,000,000 in new orders, by both British and Canadian governments, will be placed before Sept. 1.

Shipbuilders Import Steel

While primary steel producers in Canada are equipped to supply demands for billets, brass, and some other materials, the sharp increase in demand for plates and shapes for the huge shipbuilding program has turned a large tonnage of the latter business to the United States. Some shipbuilding yards are handicapped by delayed steel deliveries.

In addition, demand for sheets and light plates for construction of stoves and refrigerators is rising. Canadian mills are sold out of these materials to the end of June and it is generally believed the dominion's full capacity will be required through the remainder of the year.

To cope with the record demand for steel, various dominion steel plants have underway or are planning plant additions. Steel Co. of Canada Ltd., Hamilton, Ont., will proceed immediately with the installation of the first stand of its new four-high mill for plate production. Last fall the company added a new 150-ton open hearth and additional soaking pits. Pumping capacity and facilities for sheet pickling and processing were improved. Additional wire drawing and heading equipment was installed at several plants. Still in the offing is the company's project for a $12,000,000 to $14,000,000 continuous sheet-strip mill at Hamilton.

Dominion Steel & Coal Corp., Sydney, N. S., announces additions to its productive capacity will start operations within a month. Present facilities are operating at capacity, with a reserve blast furnace operating to build up the reserve of pig iron in anticipation of the increased steelmaking capacity.

Canadian war supply board last week ordered 7302 trucks, lorries, and tractors, costing more than $9,000,000. Order was about equally divided between General Motors of Canada and Ford Motor Co. of Canada. Other orders include:

Barrack stores—Metal Stampings Ltd., Toronto, $25,455; Otaco Limited, Orilla, Ont., $22,435; Beatty Bros., Fergus, Ont., $12,267.

Aircraft supplies—British air ministry, $198,591; Irvin Air Chute Ltd., Ottawa, Ont., $35,996; Canadian Vickers Ltd., Montreal, Que., $24,732.

Machinery—J. S. Innis Ltd., Toronto, $31,700; Turnbull Elevator Co., Toronto, $5,175.

Electrical equipment—British air ministry, $27,300; British war office, $44,300.

Munitions — British war office, $100,000.

Construction—Sterling Construction Co., Windsor, Ont., for construction work at R.C.A.F., station, Fort William, Ont., $70,700.

In connection with shipbuilding operation in British Columbia for the war supply board, Dominion Bridge Co., Vancouver, B. C., has contract to build boilers for six whale catchers under construction at Burrard Shipyards, and Vancouver Iron Works, Vancouver, will build boilers for six ships for North Vancouver Ship Repairs.

Foundry Equipment Orders in Decline

■ Foundry equipment orders in February, reported by the Foundry Equipment Manufacturers' association, Cleveland, declined slightly from January but were well above those of February, 1939. Shipments and unfilled orders showed the same relation. Comparisons follow, indexes based on 1922-24:

	Feb. 1940	Jan. 1940	Feb. 1939
Net orders	179.4	197.9	135.3
Shipments	184.2	193.2	112.2
Unfilled orders	226.5	231.2	175.1
3 mos. av. gross orders	180.9	188.9	133.3

200-Ton Girder for Edison Bridge

■ An unusually large steel girder, 260 feet long and weighing over 200 tons, is hoisted into position on the Thomas A. Edison bridge over the Raritan river at Perth Amboy, N. J. Span requires approximately 10,000 tons of steel. Girder was fabricated by Bethlehem Steel Corp. Acme photo

FINANCIAL

SAYS CURRENT CONSUMPTION, PRODUCTION BALANCE CLOSER

■ OPTIMISM regarding a moderate increase in business volume over last year's was expressed by Henry A. Roemer, president, Pittsburgh Steel Co., Pittsburgh. In his annual letter to shareholders, Mr. Roemer declared that although order backlog is diminishing balance between rates of steel production and consumption is closer than in last 1939 quarter.

Company's net earnings last year were $564,870, equal, after payment of dividend requirements on 5½ per cent prior preferred stock, to $4.18 a share on 5 per cent class A preferred. This compares with $488,423 adjusted net deficit in previous year and $522,556 net income in 1937.

Indicated fourth quarter net profit, based on nine months' and year-end reports, was $1,089,551, compared to $135,502 net loss in corresponding 1938 period. In last 1937 quarter $429,439 deficit was incurred.

Accumulated preferred dividends in arrears aggregate $3,656,177. Of this total $686,950 is on 5½ per cent first series prior preferred stock, aggregates $13.75 per share; $867,925 is on class A 5 per cent preferred stock, totaling $12.50 a share. Class B 7 per cent preferred stock has accumulated dividends of $59.50 per share, for a total of $2,101,302.

Net sales last year were $28,570,638, a 37 per cent increase over 1938's $20,827,882, but 12.7 per cent lower than $32,745,296 in 1937 and slightly above $28,545,614 in 1936.

Mr. Roemer said operations during first part of 1939 were unprofitable, but progressive improvement was shown and business had entered a profitable area prior to outbreak of hostilities in Europe.

Average operating rate in 1939 was 64.7 per cent, compared to 65 per cent for entire steel industry.

Taxes paid last year totaled $1,015,437, compared to $821,325 in 1938.

Rated ingot capacity has been increased from 720,000 gross tons in 1937 to 960,000 gross tons as of Dec. 31, 1939.

MIDVALE CO. REPORTS 1939 BOOKINGS AS ALL-TIME PEAK

Dollar value of contracts and orders received by Midvale Co., Nicetown, Philadelphia, last year was nearly three times that of any preceding year, said Harry L. Frevert, president. In his letter to stockholders Mr. Frevert said 1939 sales, of which 65 per cent represented products ordered directly by United States navy department, exceeded 1938's by 23 per cent.

Unfilled orders Dec. 31, 1939, totaled $28,566,167, with a substantial portion in long term contracts, compared to $7,689,387 year previously.

Net profit last year totaled $1,703,771, equal to $8.52 a share on capital stock, and was 37 per cent greater than 1938's $1,244,210 or $6.22 a share. Net income in 1937 was $1,341,816, equal to $6.71 a share. Dividends aggregating $6.50 a share and totaling $1,298,414 were paid last year.

Taxes for 1939 totaled $1,246,527, equal to $6.23 a share, compared to $739,990 or $3.70 a share in 1938.

Despite increase to $3,294,103 in current liabilities resulting from larger business volume net current assets also showed increase of $760,598 to $10,607,049 at year's end.

DESCRIBES FOURTH 1939 QUARTER AS "INFLATIONARY"

War in Europe, coupled with improved domestic business, brought about an inflationary condition in latter part of last year, declared D. A. Williams, president, Continental Steel Corp., Kokomo, Ind., in his annual letter to stockholders.

Previously reported 1939 net in-

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269 Iron, Steel Consumers Earn $261,891,971 Aggregate Net 1939 Profit

■ AGGREGATE 1939 net income earned by 269 iron and steel consumers totaled $261,891,971, compared to $100,309,150 net profit realized by the same companies in 1938. Only 27 reported a net loss for the year, compared to 88 in 1938. Previous tabulations in STEEL, Feb. 19, p. 29; Feb. 26, p. 16; March 4, p. 38; March 11, p. 18 and March 18, p. 22 listed 199 companies; the following includes 70. All figures are net earnings except where asterisk denotes loss:

	1939	1938
Acme Wire Co., New Haven, Conn.	$182,417	$65,483
American Hardware Corp., New Britain, Conn.	827,819	78,588
American Laundry Machinery Co., Cincinnati	316,424	15,618
American Locomotive Co., New York	950,376*	1,302,194*
American Transformer Co., Newark, N. J.	18,762	10,929*
Apex Electrical Mfg. Co., Cleveland	173,517	3,397
Autocar Co., Ardmore, Pa.	319,173	471,438*
Automatic Signal Corp., Norwalk, Conn.	35,248	44,886
Automotive Gear Works Inc., Richmond, Ind.	35,676	12,229*
Bell Aircraft Corp., Buffalo	9,203	65,488
Bliss Co., E. W., Brooklyn, N. Y.	149,044*	186,300
Boeing Airplane Co., Seattle	3,284,073*	554,958*
Breeze Corp., Newark, N. J.	177,126	135,367
Brill Co., J. G., Philadelphia	331,309*	133,566*
Bucyrus-Erie Co., Milwaukee	1,752,554	677,953
Burroughs Adding Machine Co., Detroit	2,200,814	2,706,965
Canada Iron Foundries Ltd., Montreal, Que.	367,093	202,981
Canadian Locomotive Co., Kingston, Ont.	147,880*	182,078
Colson Corp., Elyria, O.	331,881	109,763
Consolidated Aircraft Corp., San Diego, Calif.	1,104,327	1,535,110
Cooper-Bessemer Corp., Mt. Vernon, O.	164,708	298,242*
Crane Co., Chicago	4,612,554	380,698
Dictaphone Corp., New York	495,811	298,345
Durham Duplex Razor Co., Mystic, Conn.	44,279	36,604
Fairbanks Co., New York	50,427	51,117*
Fansteel Metallurgical Corp., North Chicago, Ill.	238,660	11,739
Fedders Mfg. Co. Inc., Buffalo	226,012	14,738
Ferro Enamel Corp., Cleveland	457,495	111,257
Foster Wheeler Corp., New York	91,825	162,447
Fruehauf Trailer Co., Detroit	1,829,041	264,338
General Machinery Corp., Hamilton, O.	629,180	370,130
Herman Nelson Corp., Moline, Ill.	121,944	20,512
Hobart Mfg. Co., Troy, O.	912,403	812,849
Hoover Ball & Bearing Co., Ann Arbor, Mich.	371,593	100,612
International Safety Razor Corp., Bloomfield, N. J.	12,452	376
Koppers Co., Pittsburgh	1,953,591	1,159,805
Le Roi Co., Milwaukee	38,184	54,701
Lockheed Aircraft Corp., Burbank, Calif.	3,132,918	442,111
Masco Screw Products Co., Detroit	17,087	20,038*
McGraw Electric Co., Minneapolis	1,413,182	891,858
Morse Twist Drill & Machine Co., New Bedford, Mass.	253,512	57,978*
National Enameling & Stamping Co., Milwaukee	100,699*	537,598*
Neptune Meter Co., New York	357,384	122,088
New Britain Machine Co., New Britain, Conn.	341,520	273,846
New York Shipbuilding Corp., Camden, N. J.	928,264	532,894
Niles-Bement-Pond Co., Hartford, Conn.	837,726	844,007
Northwest Engineering Co., Chicago	1,012,233	1,024,993
Ohio Forge & Machine Corp., Cleveland	305,344	6,035
Oliver Farm Equipment Co., Chicago	430,267	60,750
Pacific Can Co., San Francisco	435,799	224,029
Pittsburgh Forgings Co., Coraopolis, Pa.	293,676	91,293*
Ralston Steel Car Co., Columbus, O.	12,200*	128,843*
Reda Pump Co., Bartlesville, Okla.	446,269	603,386
Reliance Electric & Engineering Co., Cleveland	205,007	1,421
Richmond Radiator Co., Uniontown, Pa.	127,473	87,958
Safety Car Heating & Lighting Co., Inc., New Haven, Conn.	341,535	127,996
Sangamo Electric Co., Springfield, Ill.	947,421	519,725
Scovill Mfg. Co., Waterbury, Conn.	1,768,808	31,920*
South Bend Lathe Works, South Bend, Ind.	386,870	252,473
Standard Steel Spring Co., Coraopolis, Pa.	363,884	86,046
Standard Tube Co., Detroit	67,572*	147,978*
Taylor-Wharton Iron & Steel Co., Highbridge, N. J.	46,121	204,493
Timken-Detroit Axle Co., Detroit	2,653,701	828,035
Union Tank Car Co., Chicago	2,410,666	1,364,714
United Aircraft Products Inc., Dayton, O.	104,712	71,340
United Engineering & Foundry Co., Pittsburgh	2,149,328	3,192,618
United Steel & Wire Co. Inc., Battle Creek, Mich.	163,400	97,432
Victor Equipment Co., San Francisco	38,487	16,805*
Wagner Electric Corp., St. Louis	1,293,866	267,658
Warren Foundry & Pipe Corp., Phillipsburg, N. J.	501,820	281,052

come, $1,208,200, equal after dividends on preferred, to $5.28 a share on common stock outstanding, and largest of the past 11 years, was confirmed.

Dividends aggregating $7 a share on preferred and $2 a share on common were paid during 1939.

Payrolls aggregated $5,744,392, against $4,532,143 in previous year. Average number of employes was 3304 in 1939 and 3193 in 1938.

Improvements enabling Continental to maintain its competitive position in the steel industry last year cost $515,400. Additional $530,000 appropriation for further improvements has been authorized.

Taxes last year totaled approximately $791,000, equal to $3.94 a share on common, compared to $490,000 or $2.44 a share on common in 1938.

Balance sheet summary:

	1939	1938
Net sales	$18,559,294	$12,801,105
Gross profit	3,923,973	2,489,680
Profit from operations	1,900,179	790,672
Net profit	1,508,200†	632,865
Inventories	4,669,648	4,400,035
Net working capital	6,097,835	5,314,402
Current assets	7,454,971	6,531,463
Current liabilities	1,357,136	1,217,061

†Appropriation of $300,000 for future inventory price decline was withdrawn from this figure and added to reserve for contingencies.

♦

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., reports 1939 net income of $943,178. Earnings represented $6.01 a share on common after dividend requirements on $6 preferred stock. Net 1938 profit was $589,645, equal to $2.31 a share.

♦

Upturn in business during latter part of 1939 enabled Revere Copper & Brass Inc., New York, to finish the year with $1,615,069 net profit, compared to $2,125,408 net deficit incurred in 1938. Earnings were equal to 19 cents per share on common after dividend requirements on preferred and class A stock.

Pig Iron, Ferroalloy Capacity Declines

■ Pig iron and ferroalloy capacity declined last year to 55,723,640 net tons from 56,325,830 net tons as of Dec. 31, 1938, according to the American Iron and Steel institute, New York. Largely because of increasing use of scrap in steelmaking, blast furnace capacity has declined slowly but steadily since 1930 when it was 58,979,060 net tons of pig iron and ferroalloys. Capacity declined in all but two of the years succeeding 1930. Of total capacity at close of last year, 54,635,740 tons represented coke pig iron, 992,320 ferroalloys, and 95,580 charcoal iron. This compares with 55,162,374 tons of coke pig iron, 1,060,416 ferroalloys, and 103,040 charcoal iron at the close of 1938.

Production

Operating Rate Holds Steady at 62.5 Per Cent

■ STEELWORKS operations last week remained stationary at 62.5 per cent. Three districts made small gains, five declined slightly and four were unchanged. A year ago the rate was 55.5 per cent; two years ago it was 35 per cent.

Youngstown, O. — Advanced 1 point to 43 per cent with 39 open hearths and three bessemers in service. Schedule for this week shows little change. Republic Steel Corp. blew in a blast furnace Friday, the first addition since last fall.

Cleveland—Up 1 point to 74 per cent as various interests adjusted production to incoming orders.

Detroit—Dropped 4 points to 78 per cent, with 20 of 26 open hearths in operation.

Birmingham, Ala.—Unchanged at 78 per cent, 19 open hearths being active.

Cincinnati — Down 3.5 points to 51 per cent as one interest curtailed. Little change is indicated for this week.

New England—Reduction of 5 points to 65 per cent.

Central eastern seaboard—Steady at 60 per cent for third consecutive week.

Chicago—Held at 59.5 per cent despite several changes in schedules. One large interest increased fractionally but another curtailed.

Pittsburgh—Recovered 2.5 points to 57.5 per cent on a sharp gain by a leading producer. Most mills indicate little change this week.

Wheeling—Slipped 7 points to 73 per cent, all of the reduction occurring at one plant. A small increase is in prospect this week.

Buffalo—Maintained production at 51 per cent with a sharp drop to 44 per cent at the week end as three open hearths were taken off.

St. Louis—Loss of 2 points to 58 per cent on small changes by several interests.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Mar. 23	Change	Same week 1939	Same week 1938
Pittsburgh	57.5	+ 2.5	48	30
Chicago	59.5	None	56.5	31.5
Eastern Pa.	60	None	40	29
Youngstown	43	+ 1	54	29
Wheeling	73	— 7	63	41
Cleveland	74	+ 1	52.5	30.8
Buffalo	51	None	37.5	30
Birmingham	78	None	78	66
New England	65	— 5	65	18
Cincinnati	51	— 3.5	55	45
St. Louis	58	— 2	57.5	37
Detroit	78	— 4	72	27
Average	62.5	None	55.5	35

"Tell Man-in-the-Street American Way's Benefits"

■ Business and industry must tell the man-in-the-street the benefits of the private enterprise system, Charles R. Hook, president, American Rolling Mill Co., Middletown, O., told the Eastern New York Purchasing Agents association, Albany, N. Y., March 21.

"Mainspring in the American system," said Mr. Hook, "is the incentive motive. Functioning efficiently throughout the period of our greatest growth and progress, it has brought us to the pinnacle we occupy today. When we fail to take its importance into account, when we perform or permit actions which check and harass incentive, we stand in the way of future progress."

But, he added, "it is not reasonable to expect that the great rank and file of our people will militantly rise to the defense of the private enterprise system unless they can see the relation between its continued operation and their personal well-being . . . If we would save this system, those who are possessed of the facts must take off their coats, give of their time and join the army of enlightenment in order that our people may know and understand the truth."

MEETINGS

INDUSTRIAL GAS MEETING IN TOLEDO, MARCH 28-29

■ AMERICAN gas association will conduct its annual conference on industrial gas sales at the Commodore Perry hotel, Toledo, O., March 28-29. Sponsored by the association's industrial gas section, the conference program provides morning and afternoon sessions and luncheons on each day, a dinner on the evening of the first day, and numerous committee meetings.

Papers scheduled for the opening session on March 28 are: "What Results Can Be Expected from Use of Gas as a Chemical," by C. George Segeler, American Gas association, New York; "New Developments in Open-Flame Heating and Their Importance to the Gas Industry," by A. M. Thurston, East Ohio Gas Co., Cleveland; and "Load Building Through Packaged Industrial Gas Equipment," by A. F. Koch, Surface Combustion Corp., Toledo, O.

At the afternoon session, Kendall B. Castle Jr., Rochester Gas & Electric Corp., Rochester, N. Y., will speak on "Factors Involved in Merchandising Gas Air Conditioning." At the morning session on March 29, Hale A. Clark, Michigan Consolidated Gas Co., Detroit, Frederic O. Hess, Selas Co., Philadelphia, and Don A. Jacobson, Burdett Mfg. Co., Chicago, will discuss "Developments in Near-Infra-Red Ray Heating." William E. Whalen, Electric Auto-Lite Co., Toledo, O., will contribute a paper on "A Plant Engineer Looks at the Gas Industry."

Panel discussions on "Volume Water Heating," "Metal Treating and Melting," and "Process and Comfort Air Conditioning," will be conducted during the afternoon.

E. M. Tharp, vice president and general manager, Ohio Fuel Gas Co., Columbus, O., will address the luncheon on the first day.

SPECTROGRAPHIC ANALYSIS CHICAGO CONFERENCE TOPIC

Spectrographic analysis and its applications to industrial problems will be discussed at an all-day conference of midwestern metallurgists at the University of Chicago, Chicago, March 30. The conference, to be held in Kent laboratory, will be under the direction of Dr. Willis C. Pierce, assistant professor of chemistry.

Topics and speakers for the morning session are: "Analysis of Lead and Lead Alloys," by J. N. Mrgudich, University of Illinois; "Spectrochemical Analysis of Steel," by R. A. Sawyer and H. B. Vincent, University of Michigan; "Quantitative Spectrographic Analysis Solutions," by D. T. Englis and R. J. Keirs, University of Illinois; "Quantitative Determination of Low Work Function Elements in Alloy with High Work Function Elements," by R. G. Fowler and R. A. Wolfe, University of Michigan; "Lundegardh Flame Method," by Victor Elis, University of Missouri; and "Analysis of Hydrocarbon Mixtures by Raman Spectra," by E. J. Rosenbaum, University of Chicago.

Afternoon program is as follows: "Analysis of Ferrous and Nonferrous Materials by Means of Spark Spectra," by John Schuch, Harry W. Dietert Co., and George Zabel, Fairbanks, Morse & Co.; "Some Applications and Limitations of Infrared Spectroscopy," by A. M. Buswell and W. H. Rodebush, University of Illinois; "Determination of Concentration of Mercury Vapor in Admixtures with Hydrogen," by R. A. Wolfe and O. S. Duffendack, University of Michigan; and "A Study of Excitation Sources," by W. C. Pierce, N. H. Nachtrieb and E. J. Fitz, University of Chicago.

STEEL CREDIT MEN TO GO TO CONGRESS IN TORONTO

National Association of Credit Men will hold its forty-fifth annual convention and credit congress at the Royal York hotel, Toronto, Canada, May 19-23, with the Canadian Credit Men's Trust Association Ltd. participating. An iron and steel industry program is being arranged and it is expected that many credit executives in this field will attend.

REFRIGERATING ENGINEERS NAME SKYTOP FOR MEETING

American Society of Refrigerating Engineers will hold its twenty-seventh spring meeting at Skytop Lodge, Skytop, Pa., June 9-11. Society headquarters are at 37 West Thirty-ninth street, New York.

METAL TRADES ASSOCIATION HOLDING MEETING IN MAY

Forty-second annual convention of the National Metal Trades association will be held at the Biltmore hotel, New York, May 21-22. The program as usual will center around industrial relations problems.

3-DAY WELDING ENGINEERING COURSE AT OHIO STATE

Ohio State university, Columbus, O., announces a special short course in welding engineering to be held April 16-18. This will substitute for the annual welding conferences held since 1931.

During the three days classes will be held on such subjects as welded joints, fundamental mechanics, welding symbols, production welding, etc. In the case of welded joints, several classes will be devoted to the subject to afford progressive coverage. Lectures will be given by prominent engineers in the welding field, as well as by members of the university staff.

Information on the course can be obtained from J. R. Stitt, assistant professor of welding engineering.

Convention Calendar

March 28-29—American Gas association. Annual conference on industrial gas sales at Commodore Perry hotel, Toledo, O. Eugene D. Milener, 420 Lexington avenue, New York, is secretary, Industrial Gas section.

April 1-2—Association of Iron and Steel Engineers. Annual spring conference at Hotel Netherland Plaza, Cincinnati. Brent Wiley, 1010 Empire building, Pittsburgh, is managing director.

April 8-12—American Chemical society. Ninety-ninth meeting in Cincinnati. Dr. Charles L. Parsons, 728 Mills building, Washington, is secretary.

April 9-10—Midwest Power conference. Palmer House, Chicago, under auspices Armour Institute of Technology, Chicago.

April 10-12—International Acetylene Association. Fortieth convention at Hotel Schroeder hotel, Milwaukee. H. F. Reinhard, 30 East Forty-second street, New York, is secretary.

April 11-12—Galvanizers committee. Annual spring meeting at William Penn hotel, Pittsburgh. Ernest V. Gent, 60 East Forty-second St., New York, is secretary.

April 12-13—American Foundrymen's association. Regional conference at Lansing, Mich., under auspices Detroit chapter and Michigan State college.

April 22-24—American Supply and Machinery Manufacturers' association. Annual meeting at Hotel Adolphus, Dallas, Tex. R. Kennedy Hanson, 1108 Clark building, Pittsburgh, is secretary-manager.

April 22-24—National Supply and Machinery Distributors' association. Annual meeting at Hotel Adolphus, Dallas, Tex. H. R. Rinehart, 505 Arch street, Philadelphia, is secretary.

April 22-24—Southern Supply and Machinery Distributors' association. Annual meeting at Hotel Adolphus, Dallas, Tex. Alvin M. Smith, P. O. Box 1353, Richmond, Va., is secretary.

April 24—American Society for Metals. Annual tri-chapter meeting of Cincinnati, Dayton and Columbus chapters at Battelle Memorial institute, Columbus, O.

April 24-26—American Institute of Mining and Metallurgical Engineers. Conference of Open Hearth committee and Blast Furnace and Raw Materials committee at William Penn hotel, Pittsburgh, John T. Breunich, 29 West Thirty-ninth street, New York, is assistant secretary.

April 24-27 — Electrochemical society. Spring meeting at Galen Hall, Wernersville, Pa. Dr. Colin G. Fink, Columbia university, New York, is secretary.

April 25-26—Concrete Reinforcing Steel institute. Sixteenth annual meeting at the Homestead, Hot Springs, Va. H. C. Delzell, 2257 Builders building, Chicago, is executive secretary.

April 29-May 3—American Mining congress. Seventeenth annual coal convention and exposition at Music Hall, Cincinnati. Julian D. Conover, 309 Munsey building, Washington, is secretary.

April 29—American Trade Association Executives. Spring meeting in Washington. Silvia L. Pacelle, 726 Jackson place, N.W., Washington, is secretary.

MEN of INDUSTRY

■ JAMES W. COREY, since 1932 general sales manager, Reliance Electric & Engineering Co., Cleveland, was elected sales vice president at a meeting of directors March 21. Mr. Corey started in the engineering department of Reliance in 1911; was transferred to the sales department in 1916, and in 1927 was made assistant sales manager. Officers re-elected were: Clarence L. Collens, president; H. Morley Hitchcock, vice president and treasurer; A. M. MacCutcheon, engineering vice president; C. V. Putnam, secretary, and H. F. Walters, assistant treasurer.

♦

J. M. Read, New Bedford, Mass., has been named a director, Revere Copper & Brass Inc., Rome, N. Y.

♦

Benjamin T. Moffatt has been named New York district manager for Hewitt Rubber Corp., Buffalo, with headquarters in New York.

♦

W. E. Imhoff, the past two years Detroit district representative for McCord Radiator & Mfg. Co., has been named sales manager of the company's replacement parts division.

♦

John L. Lowe, former production metallurgist, Campbell, Wyant & Cannon Foundry Co., Muskegon Heights, Mich., is now foundry manager for Vilter Mfg. Co., Milwaukee.

♦

J. H. Morrison, superintendent, blooming and rod mills, Monessen, Pa., plant of Pittsburgh Steel Co., has been made superintendent of all hot rolling operations at company's Monessen and Allenport plants. W. C. Kitto, heretofore superintendent, open-hearth department, Monessen plant, has become superintendent of open hearth and blooming mill, and Edwin A. Dawson is now superintendent of the rod mill.

James W. Corey

♦

J. M. Stoddard has been appointed plant superintendent, Westcott Chuck Co., Oneida, N. Y.

♦

Harry Ewald, formerly sales manager, range division, Landers, Frary & Clark, New Britain, Conn., has joined Porcelain Enamel institute, Chicago, as director of merchandising.

♦

A. W. Krowell has been named superintendent, production department, Gary works, Carnegie-Illinois Steel Corp. Ralph D. Peterson becomes assistant superintendent of this department, and W. J. Huge assumes the post of assistant to superintendent of blast furnaces. First employed at Gary works in 1915, Mr. Krowell served in various capacities, and since 1937 has been assistant superintendent, production department. Mr. Peterson joined Gary works in 1912, and formerly was chief provider for the slab and plate mills. Mr. Huge was formerly assistant superintendent of blast furnaces Nos. 7 to 12 and metallurgist.

♦

James Y. Scott has been elected president, Van Norman Machine Tool Co., Springfield, Mass. He formerly was executive vice president, treasurer and general manager.

♦

James G. Davey has been appointed plant manager, Eastern Rolling Mill Co., Baltimore. Mr. Davey formerly was division superintendent, Republic Steel Corp., stainless sheet and strip division, Cleveland.

♦

Prof. John M. Nelson, Columbia university, New York, has been awarded the William H. Nichols gold medal of the New York section of American Chemical society, for "important contributions to the chemistry of life processes."

♦

F. C. Troescher has been appointed superintendent, National Screw & Mfg. Co., Cleveland. H. G. Westbrook has been named assistant superintendent, and R. G. Burnham, purchasing agent. Mr. Troescher is a veteran with National Screw, having joined the organization in 1894.

♦

H. E. Dralle, since 1930 gearing representative in the northwestern and southwestern districts for Westinghouse Electric & Mfg. Co.'s Nuttall works, with headquarters in Chicago, has been promoted to

W. J. Huge

R. D. Peterson

A. W. Krowell

manager, petroleum and chemical section, industry engineering department, East Pittsburgh, Pa. Mr. Dralle has been associated continuously with Westinghouse since 1916. Following general engineering activities, Mr. Dralle specialized in the application of electricity to cement, glass, railroad and oil industries.

♦

Hugh M. Corrough has been appointed manager, Alco Products division, American Locomotive Co., New York. Associated with Alco Products division since June, 1936, he has served as chief mechanical engineer, assistant manager of engineering, and manager of engineering.

♦

Edgar C. Thomas has been made eastern representative, Thomas Machine Mfg. Co., Pittsburgh, with headquarters in the Commercial Trust building, Philadelphia. He has been a sales engineer with the company at Pittsburgh several years.

♦

Robert H. Heyer, formerly a research metallurgist, American Rolling Mill Co., Middletown, O., has

Robert H. Heyer

joined Battelle Memorial institute, Columbus, O. He is a member, American Society for Metals and American Institute of Mining and Metallurgical Engineers.

♦

William J. Boyer has joined Rustless Iron & Steel Corp., Baltimore, as research chemist. He previously was associated with Carpenter Steel Co., Reading, Pa., as assistant chief chemist. He has also been acting as an instructor for Pennsylvania State college in an extension course in ferrous metallurgy.

♦

Edward P. Connell, treasurer, Falk Corp., Milwaukee, has assumed the newly created position of general manager. Walter L. Schneider succeeds Matthew A. Carpenter as sales

H. M. Corrough

manager in charge of active sales of all Falk products except those covered by the foundry division. Mr. Carpenter, who is secretary, will continue in a supervisory capacity over the sales, sales promotion and advertising departments.

♦

J. H. Newman, associated with General Electric Co., Schenectady, N. Y., since 1926, has been appointed manager of district No. 1 of General Electric's wiring material sales section, with headquarters in Boston, where he formerly was a district representative. He replaces E. G. Hall, who has been transferred to Los Angeles.

♦

Roger W. Newberry, the past ten years assistant managing director, Ruston-Bucyrus Ltd., Lincoln, England, affiliate of Bucyrus-Erie Co., Milwaukee, has returned to Milwaukee to become assistant general sales manager of Bucyrus-Erie, with headquarters at South Milwaukee. P. H. Birckhead is general sales manager.

♦

Nathaniel McL. Sage, placement officer, Massachusetts Institute of Technology, Cambridge, Mass., has been appointed director of the institute's division of industrial cooperation. He has been acting head of the division since the death last September of Prof. Charles L. Norton. He will continue as placement officer.

♦

George A. Hughes has been elected chairman of the board, Edison General Electric Appliance Co., Chicago. President of the company since its formation in 1918, Mr. Hughes will continue to be active in the business. A. D. Byler, for 16 years vice president and general manager, succeeds to the presidency. R. W. Turnbull, heretofore vice president in charge of sales, has been made first vice president.

♦

D. S. Kerr has been named manager, Atlanta, Ga., office of Allis-Chalmers Mfg. Co., Milwaukee. Mr. Kerr served as salesman in various of the company's southern offices, becoming manager of the Chattanooga, Tenn., office in 1930. As manager of the Atlanta office, both the Chattanooga and Knoxville, Tenn., offices will be under Mr. Kerr's jurisdiction. J. I. Onarheim, since 1935 a sales engineer in the transformer division, has been named manager of the Chattanooga district office, succeeding Mr. Kerr.

♦

Benjamin Schwartz, Schiavone-Bonomo Corp., Jersey City, N. J., has been re-appointed chairman, export committee, Institute of Scrap Iron and Steel Inc., New York. Harry Harris, Harry Harris & Co., Jacksonville, Fla., has been re-appointed vice chairman of this committee.

♦

C. N. Kirkpatrick has been elected vice president and general manager, Landis Machine Co. Inc., Waynesboro, Pa. He formerly was vice president in charge of sales and also secretary. J. H. Elliott, purchasing agent, has been elected secretary to succeed Mr. Kirkpatrick. He also continues as purchasing agent.

Died:

■ R. E. CLINGAN, 60, Chicago district sales manager, Jones & Lamson Machine Co., Springfield, Vt., March 11 in St. Petersburg, Fla. Born in New Haven, Conn., he received his education and early training in engineering and machine shop practice there. He first became associated with F. B. Shuster Co., New Haven, subsequently joining Hess-Bright Co., now SKF Industries, Philadelphia. He remained there until 1919 when he went with Bock Bearing Co., Toledo, O., as vice president and general manager, the following year becoming president. When that company was sold to Timken Roller Bearing Co., Canton, O., in 1927, he remained with Timken in an executive capacity, and later joined New Departure Co., Bristol, Conn., in charge of industrial sales. He resigned that position in 1934 due to illness and after a six months' rest, joined Jones & Lamson as Chicago district sales manager.

♦

Thomas M. Butler, associated with Welding Equipment & Supply Co., Detroit, March 16 in Detroit.

♦

Charles E. Wain, 74, owner of Wain Machinery Sales Co., Detroit, in that city, recently.

♦

D. D. Wessels, 78, chairman of the board, D. D. Wessels & Sons

Co., Detroit, in Detroit, recently. He founded the company in 1908 and had been active until the past two or three years.

♦

L. H. Gloe, 59, auditor and purchasing agent, Leyse Aluminum Co., Kewaunee, Wis., recently.

♦

Franklin B. Giesler, 87, president, Nortmann-Duffke Co., Milwaukee, March 14 in Milwaukee.

♦

John F. Tremmel, 46, shop superintendent, Lakeside Bridge & Steel Co., Milwaukee, for 20 years, March 1 in Wauwatosa, Wis.

♦

Col. George W. Burleigh, 69, secretary-treasurer from 1899 to 1913 of Harvey Steel Co. of New Jersey, March 15 at his home in New York.

♦

Emanuel S. Eplett, 43, designing engineer, Sullivan Machinery Co., Michigan City, Ind., recently in that city.

♦

Charles F. Splitdorf, 72, inventor of the Splitdorf magneto, and a part owner of Splitdorf-Edison Co., Newark, N. J., in New York, March 3.

♦

Joseph E. Brown, 74, president, Reed Foundry & Machine Co., Kalamazoo Railway Supply Co., and other industrial and banking activities, March 13 in Kalamazoo, Mich.

♦

Carl A. Swanstrom, 44, president and director, Elastic Stop Nut Corp., Elizabeth, N. J., and director, American Gas Accumulator Co., Elizabeth, in Orange, N. J., March 12.

♦

Samuel B. Chapman, 53, vice president, Manistee Iron Works, Manistee, Mich., March 13 in that city. He had been in charge of the company's valve and hydrant division in recent years.

♦

George Herbert Hall, 59, secretary and one of the founders, Cleveland Rock Drill Co., Cleveland, in that city, March 7. At one time he was treasurer, Cleveland Pneumatic Tool Co. of Canada Ltd.

♦

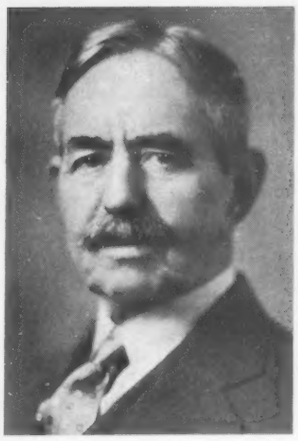
Col. Edwin W. M. Bailey, 77, president, Bailey Inc., Amesbury, Mass., maker of automotive parts, March 8 at Barbadoes, British West Indies, where he had been vacationing.

♦

Daniel J. Moloney Sr., 67, former superintendent, Lakeside plant of Otis Steel Co., Cleveland, and an employe of the company over 30 years, March 11, in Chicago. He moved to Chicago ten years ago to become associated with Bally Mfg. Co., of which his son is president.

♦

Ephraim A. Schwarzenberg, 80, president, E. A. Schwarzenberg Co., Cleveland, March 17 at Miami Beach, Fla. He had been engaged in the iron and steel scrap business in



E. A. Schwarzenberg

Cleveland many years. In 1882 with his brother, he founded the scrap firm of H. L. & E. A. Schwarzenberg which later became Schwarzenberg, Hays & Co. When that firm was dissolved in 1887, Mr. Schwarzenberg opened an office and this enterprise was incorporated in 1924 as E. A. Schwarzenberg Co.

♦

Herman A. Wagner, 70, retired president, Wisconsin Bridge & Iron Co., Milwaukee, March 19 at his home in that city. He joined Wisconsin Bridge about 1888, serving successively as secretary, general manager, and as president and treasurer from 1917 until his retirement a year ago. He was a member, American Institute of Steel Construction.

♦

Walter Francis Keenan Jr., 54, director and vice president in charge of engineering, Foster-Wheeler Corp., New York, in Pelham Manor, N. Y., March 18. He was associated with the corporation 29 years and was chief engineer for a number of years before his election to the vice presidency in 1935. He was president, American Boiler Manufacturer's association, and a member, American Society of Mechanical Engineers.

♦

Melvin L. Wilcox, well known in the automotive industry, March 14 in Jacksonville, Tex. He founded Jackson-Church-Wilcox Co., and with the advent of the automobile invented the Jacox steering gear, later sold to General Motors Corp. He was associated with Buick Motor Co., Flint, Mich., for a time, but returned to Saginaw to become one of the founders of Wilcox Motor Parts & Mfg. Co., now Wilcox Rich division of Eaton Mfg. Co.

Activities of Steel Users, Makers

■ JOSEPH T. RYERSON & SON INC., Chicago, has added a new high-bay type span to its Detroit plant, increasing floor space by over 30,000 square feet, and bringing total floor area of the plant to approximately 250,000 square feet. In addition to housing part of the hot-rolled steel stock, the building will greatly increase facilities for reinforcing steel service to contractors and builders.

♦

Hydraulic Press Mfg. Co., Mount Gilead, O., has moved its New York office to larger quarters at 233 Broadway.

♦

Square D Co., Milwaukee, has awarded contracts for the design and construction of a new plant and office building, 238 x 430 feet, to the Austin Co., Cleveland.

♦

Superior Steel Corp., Pittsburgh, has appointed Edgcomb Steel Corp., Newark, N. J., and Edgcomb Steel Co., Philadelphia, sales representatives and warehouse distributors for its line of cold-rolled stainless strip steel.

♦

Mayer Mfg. Co., Chicago, has taken 40,000 square feet of space, leasing a one-story building at 3114 West Fifty-first street, in the Kenwood manufacturing district. The company makes wire and metal specialties.

♦

E. J. Ehret and J. D. Kinsey, with offices at 307 South LaSalle street, Chicago, have been appointed sales representatives in the Chicago territory for John Waldron Corp., New Brunswick, N. J., handling its complete line of Waldron gear type and Francke flexible couplings.

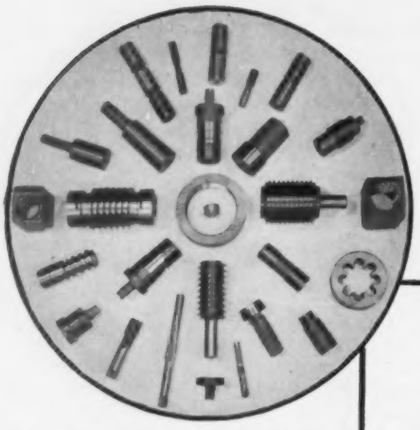
♦

Elastic Stop Nut Corp., Elizabeth, N. J., has broken ground for a new plant on Vauxhall road, Union, N. J., a suburb of Newark. The plant will be used for manufacture of self-locking nuts. Transfer from the present plant will be made about June 1. Austin Co., Cleveland, is general contractor.

♦

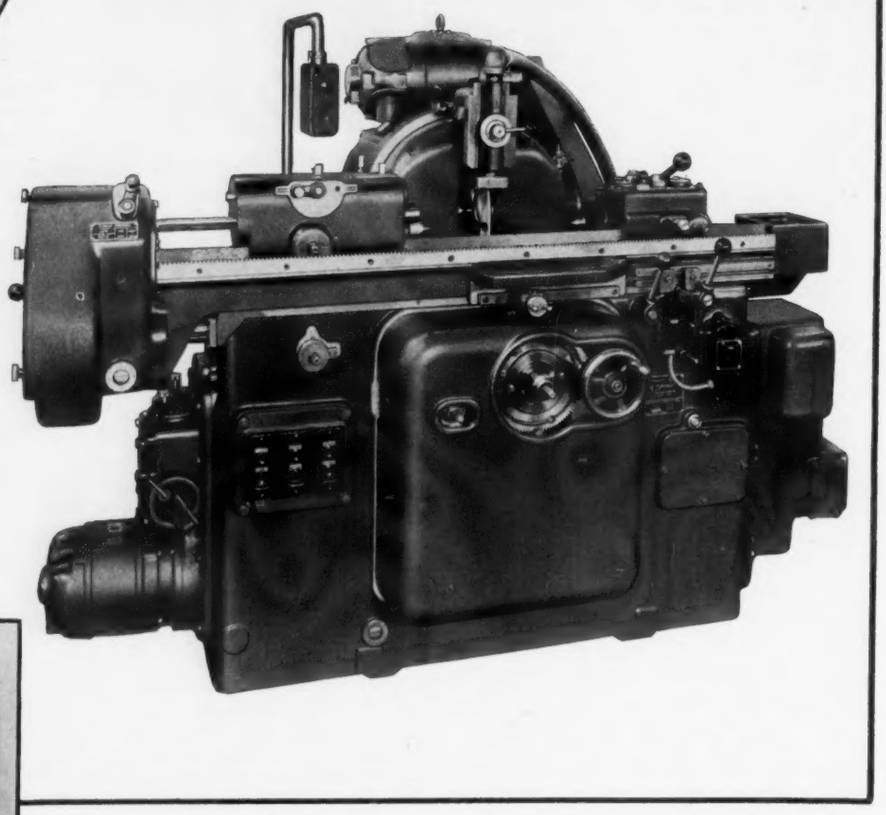
W. B. Lawson Inc., Union Commerce building, Cleveland, has been formed by William B. Lawson, formerly of the Harshaw Chemical Co. and International Nickel Co., to deal in industrial chemicals, oils, and nonferrous metals. Mr. Lawson joined the Harshaw organization in 1930, resigning in January of this year. Previous to that he was with International Nickel many years, and when he resigned in 1930 he was director of sales.

LONG
OR
SHORT THREADED WORK



The longest piece shown is 8" long.

IT'S A JOB FOR THE J&L AUTOMATIC THREAD GRINDER



The longest piece shown is 30" long.

The Jones & Lamson Automatic Thread Grinder has all those features necessary to handle a large variety of work. Short or long threaded work; threads of small diameter or of large diameter; fine or coarse pitches; single or multiple threads, right or left hand; are all handled by this versatile machine.

The machine may be set up, and one thread finish ground and inspected within the time usually taken to set up an engine lathe and to cut one thread with a single pointed tool. Subsequent threads may be ground in a fraction of the time taken on an engine lathe.

Standard attachments can be supplied at any time for grinding relief on fluted taps and hobs, for grinding annular grooves on hobs and chasers without lead and for grinding internal threads. Tapered threads may be ground with the use of a simple former — *without compensation for lead error.*

The result is a machine that will earn profits on large or small quantities of precision threaded work no matter what your threading requirements may be.

Send samples or blue prints of your work for complete information.

Manufacturers of: Saddle & Ram Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Double-end Milling & Centering Machines . . . Automatic Thread Grinding Machines . . . Comparators . . . Tangent and Radial, Stationary and Revolving Dies and Chasers.

JONES & LAMSON MACHINE CO., SPRINGFIELD, VERMONT

Windows of *WASHINGTON*

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ INCREASE in membership of the national labor relations board from three to five members was favored by the house labor committee last week by a 14 to 3 vote, according to Chairman Norton, New Jersey. Mrs. Norton's announcement followed an executive session. She said the committee by a close vote had rejected proposals to abolish the present board and establish a new one. Action by the Norton committee was caused by recommendations of the special Smith committee, which has been investigating the labor board, and which recommended many drastic changes in the national labor relations act and board.

Norton committee opposed changes in the declaration of policy such as recommended by the Smith committee.

Discussing the increase in the board membership, Mrs. Norton said:

"This step seems absolutely necessary.

"A great many people take the position that if two more members were added to the board, a lot of other complaints would go out the window. That seems to be where they all start.

"Apparently there has been more or less of a deadlock in the board, and by adding two members we certainly would destroy the effect of that, if there is such a thing."

In connection with the labor board congressional investigations, President William Green, American Federation of Labor, last week started a new drive for amendments to the labor relations act and warned congress that failure to take such action now "may result in future moves to destroy or repeal the entire act."

President Green announced that the AFL has rejected the amendments introduced by the special Smith committee because as a whole they "strike in a destructive way at vital, fundamental principles of the labor relations act."

At the same time, Mr. Green urged favorable consideration by congress of changes in the law proposed by AFL "to assure just and impartial administration and to safeguard the act's fundamental guarantees of protection to labor."

Senator Wagner, New York, author of the law, announced on the senate floor last week that he would favor increasing the personnel of the board from three to five members. This increase in board membership is also sponsored by the AFL.

Mr. Green declared the investigation by the Smith committee had fully established the AFL's charges of maladministration against the labor board.

TNEC STUDIES BARRIERS TO INTERSTATE TRADE

Temporary national economic committee last week held hearings on interstate trade barriers and their effect on trade.

Trade barriers were defined at the outset as "a statute, regulation or practice which operates or tends to operate to the disadvantage of persons, products or services coming from sister states, to the advantage of local residents, products and enterprises."

Haskell Donoho, counsel, told the committee that "within the time allotted for these hearings, the purpose is to present testimony covering a comprehensive but not exhaustive treatment of important aspects of trade barrier laws. This presentation will include: Historical background of the subject; what the states themselves have done so far to meet the problem; the legislative bases supporting trade barrier practices; trade barrier laws in the fields of agricultural products; motor transportation; state and municipal restrictions in the building trade, and a concluding summary and recommendations."

Frank Bane, executive director of the council of state governments, told the committee there is a new war between the states being fought with commercial weapons as the result of the states' growing fondness for trade barriers against products from other sections.

"Direct retaliation by affected states has followed inevitably," Mr. Bane said. "Retaliation leads to counter-retaliation, and counter-retaliation to still more stringent measures. In some instances states have been on the verge of severing relationships and engaging in general commercial warfare.

"Such was the case, for instance, when three states, suffering from a beer trade barrier in another state, threatened to cease purchasing any liquors whatever from that state unless the enforcement of its law was relaxed, and to boycott any and all products from the state."

Mr. Bane urged that congress take some steps to discourage the practice of erecting the barriers, although he granted that a national antibarrier program might be accompanied by such great administrative problems that its purposes would be defeated.

PROPOSES $500,000,000 FOR STRATEGIC MATERIALS

Joint resolution has been introduced in the house by Representative Faddis, Pennsylvania, authorizing $500,000,000 for the purchase of strategic and critical materials over next five years. A similar bill has been introduced in the senate.

Resolution provides for the purchase "of materials produced in foreign countries and not produced in adequate quantities by the United States and determined by the army and navy munitions board to be stra-

tegic and critical materials or materials essential to the common defense or the industrial needs of the United States." Provision is made that the purchases shall be under the direction of the army and navy munitions board and that "all materials acquired under the provisions of this joint resolution, except for rotation to prevent deterioration, shall be used only upon the order of the President in time of war, or when he shall find that a national emergency exists."

STEEL FREIGHT RATES TO GULF PORTS REDUCED

Railroads have agreed to make a reduction of 15 cents a hundred pounds in the rates of iron and steel articles from steel producing centers to Gulf ports. It is reported that this reduction is being made to meet competition of barge lines including both government and privately owned. Reduction will be put into effect as soon as authority can be obtained from the interstate commerce commission.

Hearing has been set for April 5 at Birmingham, Ala., by the commission on the petition of carriers for fourth section relief permitting them to make the reduction on through traffic to the Gulf ports without cutting the rates to intermediate points.

DOMESTIC PRODUCTION OF MANGANESE UP IN JANUARY

Domestic production of manganese ore containing 35 per cent or more manganese during January was 4000 long tons; shipments were also 4000 tons, and producers' stocks at the end of the month were 2000 tons, according to the bureau of mines, department of the interior. In December, production and shipments were 3600 and 3400 tons, respectively, and producers' stocks at the end of the month were 2000 tons. The rate of shipments during January was substantially more than the monthly average of 2110 tons in 1938, when the total was 25,321 tons.

Arkansas, Georgia and Montana contributed virtually all the manganese ore shipped in January.

According to data supplied by the bureau of foreign and domestic commerce, January imports for consumption of manganese ore containing 35 per cent or more manganese were 80,537 long tons containing 39,409 tons of manganese. Of the imports in January, Russia supplied 44 per cent; the Gold Coast supplied 22 per cent; Brazil, 15 per cent; Cuba, 7 per cent; British India, 7 per cent; and the Philippine Islands 5 per cent. For the year 1939, imports for consumption were 627,129 long tons containing 313,810 tons of manganese, of which the Gold Coast supplied 39 per cent; Russia, 21 per cent; Cuba, 17 per cent; British India, 14 per cent, and Brazil, 7 per cent. In addition, 30,684 tons containing 8898 tons of manganese (29 per cent Mn) were entered from the Union of South Africa.

General imports, which represent the movement to this country, amounted to 108,257 long tons containing 52,179 tons of manganese in January, of which the Gold Coast supplied 26 per cent; Brazil, 25 per cent; Russia, 23 per cent; British India, 14 per cent; Cuba, 5 per cent; and the Philippine Islands and the Union of South Africa about 4 per cent each.

During the year 1939, the general imports of ore containing 35 per cent or more manganese were 698,490 long tons containing 341,816 tons of manganese, of which 29 per cent came from Russia; 22 per cent from the Gold Coast; 16 per cent from British India; 15 per cent from Brazil; and 15 per cent from Cuba. In addition, 30,684 tons containing 8898 tons of manganese (29 per cent Mn) moved to this country from the Union of South Africa.

According to data of the bureau of foreign and domestic commerce, stocks of manganese ore in bonded warehouses as of Jan. 31 amounted to 927,979 long tons containing 454,496 tons of manganese, compared with 900,436 tons containing 441,806 tons of manganese as of Dec. 31 and with 842,048 tons containing 418,721 tons of manganese at the beginning of 1939.

GOVERNMENT BUYS 10,000 TONS OF MANGANESE ORE

Award of two contracts for a total of 10,000 long tons of manganese ore under the strategic materials act has been announced by the procurement division.

L. W. Lambert, Upper Lake, Calif., received a contract for 5000 long tons of grade B manganese ore at 65 cents per unit, C.I.F., South Baltimore, Md. The contract totals $156,000 and is for the full quantity asked for in the bid invitations issued Feb. 15.

An award on bids opened Feb. 20 also was made to Lucien L. Patrick, Los Angeles. This contract is for 5000 long tons of grade A manganese ore at 62 cents per unit or a total of $148,000. Delivery will be made at the United States army ordnance depot, Ogden, Utah.

PRESIDENT DEFENDS EXPORTS OF MILITARY AIRCRAFT

Sales to foreign countries of the latest type of airplanes were defended at a White House press conference by the President last week when he told newsmen that there are no secrets of aircraft design, only secret devices. These secret devices, he said, are not being sold abroad.

The Chief Executive described as "bunk" statements made recently that vital American military secrets are being divulged by airplane sales abroad. He told the newspaper correspondents that all of the secret devices are being carefully guarded by the United States.

President Roosevelt stated that foreign airplane orders have trebled plant capacity in the United States during the past year. Inadequate aircraft production in the United States, he said, presents an even more serious national defense problem than the shortage of planes and pilots. The increased capacity for airplane manufacture in this country represents the year's most amazing and significant stride for preparedness.

GOVERNMENT IRON, STEEL AWARDS TOTAL $561,281

During the week ended March 9, the government purchased $561,281.21 worth of iron and steel products under the Walsh-Healey act as follows: Apollo Steel Co., Apollo, Pa., $15,500.95; General Cable Corp., Philadelphia, $14,674.80; Aero Supply Mfg. Co. Inc., Corry, Pa., $16,315.83; Allegheny Ludlum Steel Corp., Pittsburgh, $69,646.00; Continental Roll & Steel Foundry Co., East Chicago, Ind., $11,457.46; Noland Co. Inc., Washington, $29,683.

Jamestown Steel Partitions Inc., Jamestown, N. Y., $23,570; The Henkel Co., Fremont, O., $20,129.10; Utica Drop Forge & Tool Corp., Yorkville, N. Y., $14,321.70; Pressed Steel Tank Co., West Allis, Wis., $14,039.45; Crucible Steel Co. of America, New York, $32,577.74; Central Iron & Steel Co., Harrisburg, Pa., $14,250.32; Pittsburgh Screw and Bolt Corp., Pittsburgh, $19,950; Bethlehem Steel Co., San Francisco, $11,775.38.

Bethlehem Steel Co., Bethlehem, Pa., $14,028.14; Walter Kidde & Co. Inc., New York, $20,184.50; American Chain & Cable Co. Inc., American Cable division, Wilkes Barre, Pa., $15,564; Foster Wheeler Corp., New York, $32,104.06.

Youngstown Sheet & Tube Co., Youngstown, O., $24,558.20; Merco Nordstrom Valve Co., Pittsburgh, $12,518.44; Northill Company Inc., Los Angeles, $41,864.40; Jessop Steel Co., Washington, Pa., $12,179.81; Sharon Steel Corp., Sharon, Pa., $13,742.93; Belt & Nut division, Republic Steel Corp., Cleveland, $13,225; United States Pipe & Foundry Co., Philadelphia, $11,820; Judson Steel Corp., Oakland, Calif., $12,700; and Reeves Steel and Mfg. Co., Dover, O., $28,900.

AVIATION

PAN-AMERICAN TO INCREASE TRANS-OCEANIC SERVICE

■ DAILY service to Europe and Hawaii at substratosphere altitudes within two years was announced by J. T. Trippe, president, Pan American Airways Corp., Jersey City, N. J., last week. In 8 months there will be a plane leaving for Europe every other day, with service extended to four, five and six days a week, as needed.

Land-type planes will be used because of their favorable payload to gross weight ratio. Sealed cabins holding air at a pressure of 4 pounds per square inch will permit comfortable travel at altitudes over 20,000 feet. Cruising speeds around 270 miles per hour and planes larger than either the Douglas DC-4 or the Boeing 4-motored 307 "Stratoliner" are promised.

Notable increase in South American passenger traffic, Mr. Trippe said, is due primarily to the European war diverting American tourist trade to the Americas. This week Pan American is receiving a pressurized-cabin substratosphere plane which will fly at 23,000 feet, and will be placed in the South American service. Flying time from Miami, Fla., to Rio De Janeiro will be reduced from 6 to 3 days.

Despite Russo-Finnish peace, Scandinavian countries are continuing to buy military craft. The Norwegian air mission bought 50 Curtiss P-36 pursuit planes, 24 seaplane-type N-3 Northrop patrol bombers and is negotiating for 36 Douglas bombers. Sweden has not canceled its order for 100 pursuit planes from Republic Aviation Corp., Farmingdale, L. I., of which 30 have reached Sweden, and the 144 pursuit planes from Vultee Aircraft Corp., Downey, Calif.

France in the first two months this year purchased aircraft valued at $55,749,131. February purchases totaled $38,595,040.

French aviation industry is reported to have developed a pursuit plane with a speed greater than the famous German Messerschmidt 110 with a reputed speed of 385 miles per hour. French Air ministry said this would not curtail purchasing of the American Curtiss planes.

For manufacture of the more delicate parts of planes, an underground factory has been built in France to permit uninterrupted work during bombardments.

Order for six flagship passenger airplanes totaling $600,000 was placed with Douglas Aircraft Corp., Santa Monica, Calif., by American Airlines Inc., Chicago. Aircraft deliveries to airlines by Douglas Aircraft Corp. will total $19,000,000 for 1940 and 1941, according to Donald W. Douglas, president.

Landing Speeds Too High

Some American aircraft engineers believe that if this country entered a war, present types of fighting planes would be discarded within three months. Current models are considered too hard to fly under war conditions. European war experience indicates that for every flyer killed in combat, six or seven lose their lives in accidents not connected with combat.

Landing speed of most fighting craft is between 85 and 90 miles per hour and control boards are cluttered with instruments requiring pilot's attention. In peace time pilots can land such planes without accidents, but in war time, landing crashes are frequent.

Need is for a plane with a reasonable landing speed and fewer controls or instruments for pilot to watch.

Monorail conveyor system is being installed at Piper Aircraft Co., Lockhaven, Pa., which carries fuselages and wings nearly 3000 feet through the plant. A fuselage leaving the welding department would go through covering, finishing and paint departments without leaving conveyor, except to be shunted to a ferris wheel carrier for impregnating fabric coverings. Fuselages leave conveyor as completed planes.

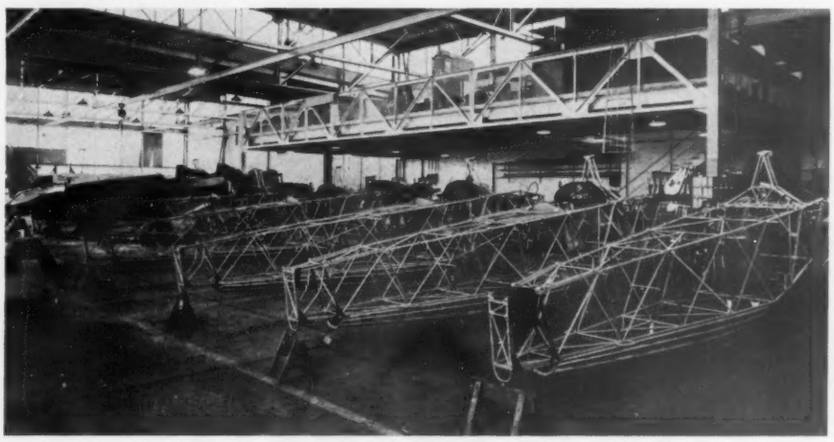
To help relieve the plane engine bottleneck in Southern California, Phillips Aviation Corp., Los Angeles, recently acquired patents and rights to engines made by Glenn L. Martin Co., Baltimore. Production will begin immediately on the former "Martin 333" motor which has been renamed "Phillips 333."

United States war department allotted $50,000 to National Academy of Sciences to study factors which would increase aircraft production in this country. Col. Leonard S. Horner, consulting engineer, Hartford, Conn., has been appointed by the academy to head the study.

Forerunner of a move by railroads to increase their freight rates on aircraft engine parts when held responsible for full value of freight handled is seen in new rate schedules filed with interstate commerce commission by New York, New Haven & Hartford railroad. Rate increases range up to 150 per cent

Recent survey by market research department of Lockheed Aircraft Corp., Burbank, Calif., among 1000 pilots, engineers and maintenance men was 59 per cent in favor of the low-wing type monoplane in lieu of the high-wing type. Though the low wing cuts off passengers' view of the ground, it is conceded to be the safer wing.

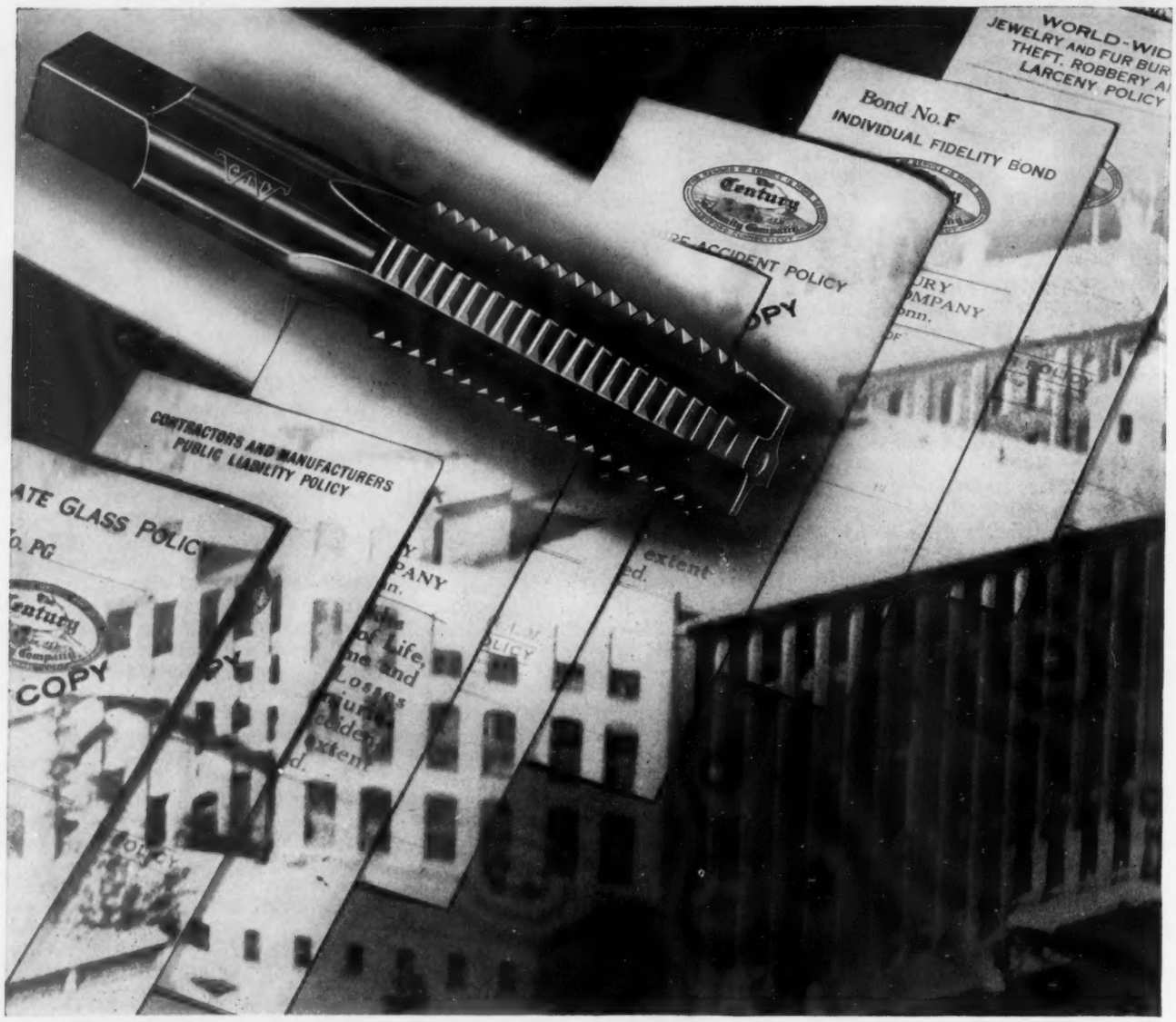
Small Plane Fuselage Formed of Welded Steel Tubing



■ **Assembly line at aircraft division, Fairchild Engine & Airplane Corp., Hagerstown, Md., showing welded steel tubing fuselage construction of the Fairchild M-62 private plane. Fuselage later is covered with fabric on sides and metal on top**

February Ohio River Shipments Set Record

■ February shipments of iron and steel products on the Ohio river in the Pittsburgh district were at a record level for that month. Traffic involved 145,500 net tons, against 31,700 tons in January and 93,600 tons a year ago according to the United States engineer report. Movement of all products totaled 835,800 tons in February, compared with 314,800 tons in January and 879,850 tons a year ago. Iron and steel shipped over the Monongahela river involved 72,600 tons in February, 47,500 tons in January and 60,500 tons a year ago but was short of the February, 1937 peak of 95,760 tons.



PRODUCTION PROTECTION

THESE ARE FACTS

"The '*Greenfield*' engineer who suggested the use of 'Maxi' taps on this job gave us advice that has turned out to be the best possible insurance against production loss in our plant," writes this Pennsylvania Manufacturer.

"We were tapping seamless steel tubing. Our best previous record was 80 holes per tap. With a 'Maxi' tap we threaded 1200 holes on the same job without grinding, and as far as we could see the tap showed absolutely no signs of wear."

"Maxi" taps insure against production loss in two ways—on tool costs and production time. The secret is the surface treatment which has been especially developed by "*Greenfield*" to meet modern requirements. You can always tell a "Maxi" tap by its jet black finish. We'll be glad to recommend one specially designed for your particular job.

GREENFIELD TAP & DIE CORPORATION—GREENFIELD, MASS.

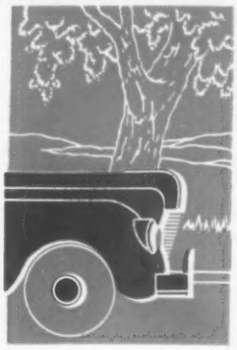
DETROIT PLANT: 2102 WEST FORT ST.

Warehouses in New York, Chicago, Los Angeles and San Francisco
In Canada: Greenfield Tap & Die Corporation of Canada, Ltd., Galt, Ontario.

GTD GREENFIELD

TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

Mirrors of *MOTORDOM*



By **A. H. ALLEN**
Detroit Editor, STEEL

DETROIT

■ SYNCHROMESHING of an automobile manufacturer's products and policies with the car buyer's tastes and desires calls for a technic best described as two parts diplomat and three parts Gallup poll. Ablest practitioner in the industry is H. G. "Buck" Weaver and his customer research staff of General Motors Corp. Last week here Mr. Weaver entertained 200 hard-bitten engineers at a Society of Automotive Engineers meeting with one of his typically dynamic and Floyd Gibbonsish presentations on probing the buyer's mind to ascertain what he wants or thinks he wants in motor cars.

Acknowledging the limitations of customer research, he pointed out that his surveys at least provide a *measure* of public taste in automobiles, despite the fact the public in general is an inarticulate body regarding technical details. It can "see" and "feel," but is weak on putting its sensations into words. However, among car buyers, Mr. Weaver has corralled several special groups of a "sophisticated" type which can be counted on to supply more expressive and imaginative responses to questionnaires.

Customer Research Stimulating

What are the values of customer research? Five were listed by Mr. Weaver. First, it provides a periodic audit of product design; second, it provides a periodic audit of competitors' designs; third, it throws light on the "boundary line" of public acceptance, or on what new ideas can be considered worthy of promotion because of their likelihood of public approval; fourth, it promotes a consumer consciousness in the ranks of the manufacturer; and fifth, it has a certain nuisance value to the manufacturer in the form of an antidote to specialized thinking.

From his extensive investigations, Mr. Weaver drew a number of conclusions as to essential steps in promoting harmony between seller and buyer. In the first place, before any such harmony can be established on the outside, there must be harmony on the inside between all the various divisions of a large car manufacturer—executive, engineering, production and sales. And in this regard, it has been found that the high degree of specialization evident today in car manufacturing tends to work at cross purposes as to harmony and progress. One specialist, the engineer for example, too often fails to appreciate the viewpoint of another specialist, the salesman.

The cure for this trouble is a "specialist in generalities," if such an individual can be imagined—a man who keeps in touch with all phases of manufacturing and selling but who concentrates on no

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Throws First Switch in New Chrysler Laboratory

■ **Throwing switch starting first testing apparatus in Chrysler Corp.'s modern automobile engine testing and research laboratory, to be completed in early May, is Dr. Karl T. Compton, president, Massachusetts Institute of Technology. F. M. Zeder, left, Chrysler board vice chairman in charge of engineering and Carl Breer, right, executive engineer and research director, assisted Dr. Compton**

one of them to exclusion of others.

Heads of large corporations today are the best examples of specialists in generalities, and they perhaps owe their success to the fact they began their careers in smaller industries where specialization was not practiced to the extent of today. This poses the question: Where are the executives of tomorrow coming from, in view of the almost universal inoculation with over-specialization apparent today?

Weaver's studies convince him that the greatest opportunities for advance in motor cars lie in the so-called twilight zones separating the various functions of a manufacturer. Between production and engineering divisions, between production and sales divisions, is fertile ground for cultivation in evolving new and better motor cars.

As an example, the matter of instruction books was cited. Four years ago, 17 out of 20 instruction books contained information on how to store cars for winter season, in spite of efforts of engineers and designers to perfect new devices to make motor cars suitable for year-'round driving. Here was a "twilight zone" which, when fully explored, led to the development of completely new instruction booklets, today models of explicitness and completeness.

Engineer Has Stake

The engineer, maintains Mr. Weaver, must realize he has a definite stake in making his products acceptable to the public, and also in ascertaining that his creations are properly and fully interpreted to the public. There seems to be too many instances like that of the Iowa farmer who a few years ago when synchromesh transmissions were introduced and millions spent on their advertising, came near bringing suit against a car manufacturer because his car did not have a wire mesh radiator grille guard which was his conception of what "synchromesh" was supposed to be.

Mr. Weaver cited the amusing results of a recent survey made in the attempt to determine whether car doors should be hinged at the front or at the rear. His staff interviewed a group of engineers in the corporation, listing their comments as to advantages of the one type of mounting versus the other, but could draw no definite conclusions, because there were just about as many advantages as disadvantages, all concerned with technical or constructional details. Finally interviewers were sent to a Cincinnati hotel, where they questioned all elderly ladies coming out of the building and entering cars. These dowagers were practically unanimous in preferring doors hinged at the front, because, they said, such doors screened their exposed limbs from the stares of passersby. Such a consideration naturally never entered the minds of engineers but nevertheless represented a cross section of a certain consumer taste.

■ REGARDLESS of how doors are hinged, it appears the 1941 models are slated to have still longer and heavier hoods, with more makes switching to the alligator-type or single-piece hood. Hinging and counterbalancing of these large hoods is no simple problem, especially when some designs are being extended back almost to the windshield. More extensive use of dash locking hoods of this type also appears in the wind. Chevrolet and Hudson are two converts to dash locks, and with other models changing to alligator hoods the provision of dash locks seems a natural.

Experiments on chemical treatment of steel and iron surfaces to improve wear resistance are continuing. The phosphate or Granoseal type of treatment is now being used on tappets, camshafts and other moving parts, and tests appear to indicate the method has possibilities in the treatment of cylinder bores. Fine stones are required in finish honing of bores, and it has been discovered that by finishing with a rough stone and then chemically treating the surface a saving can be made on honing costs, and a bore provided that may even dispense with the necessity of anodizing or otherwise treating pistons.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,962	449,314
Feb.	202,597	317,520	.....
March	238,447	389,495	.....
April	237,929	354,266	.....
May	210,174	313,248	.....
June	189,402	324,253	.....
July	150,450	218,494	.....
Aug.	96,946	103,343	.....
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
Feb. 24	102,570	75,660
Mar. 2	100,855	78,705
Mar. 9	103,560	84,095
Mar. 16	105,720	86,725
Mar. 23	103,395	89,400

†Comparable week.

	Week ended Mar. 23	Mar. 16
General Motors	45,990	45,730
Chrysler	20,510	25,310
Ford	23,100	21,425
All others	13,795	13,255

Phosphate treatment of the ends of Pontiac tappets was instituted on 1940 model production, and an interesting variant of the process was used recently to salvage a lot of 75,000 tappets, some of which were found to have chilled surfaces on the sides instead of just on the bottom.

These tappets are of gray iron, cast in sand against chill plates and by some miscarriage of manufacturing control a few were chilled on the side badly enough to interfere with finish grinding. The entire lot was given an overall Granoseal treatment and then inspected. Those improperly chilled displayed a color variation in the phosphate coating because of the differential in rate of attack on chilled and unchilled surfaces. The few defective tappets thus were readily discovered and scrapped, the others dispatched on through routine grinding operations and into production.

Copper Plating Chemically

American Chemical Paint Co., controling the Granoseal type of treatment, has recently developed a new method of copper plating steel without the use of current, by introducing active copper salts into a pickling bath. The additive material is known as Cuprodine and is claimed to produce a fine, bright (also probably quite thin and soft) copper coating in a matter of seconds on wire or strip.

The idea is seen applicable to the localized masking of surfaces prior to carburizing, or for providing a foundation coating prior to bonding with rubber. Suggested application in the automobile industry is for coating running board steel prior to covering with rubber. This steel now is brass plated, and copper plating likely would be considerably less expensive, if as good a bond could be obtained.

Another nonferrous metal development in the automotive field relates to the use of aluminum alloy connecting rod bearings. These bearings, of an alloy with tin and antimony, are cast and fitted into connecting rods with a backing necessary. Tests have been made with the bearings in Cleveland and reported to have been successful.

Corrosive effects of certain oils and the need for more generous clearances because of the different coefficient of expansion of aluminum are problems which must be considered. Costs of such bearings are said to be somewhat higher than conventional types, and strengths under load are below what can be achieved in bearings like Cleveland Graphite Bearing Co.'s new micro-bearing, steel backed with 0.0025-0.005-inch of babbitt. The latter is claimed to show maximum strength under load of around 6000 pounds per square inch.

PENNSALT CLEANER

ELIMINATES PRECLEANING, SAVING TIME AND FLOOR SPACE FOR RCA MANUFACTURING CO., INC.

● In the finishing of radio chassis and other radio parts the RCA Manufacturing Company, Inc., uses the same care and maintains the same high standards that the public has learned to identify with the world-famous products of this company.

For this reason it is highly significant that the adoption of Pennsalt Cleaners enabled RCA to eliminate entirely a precleaning operation with no sacrifice in cleaning efficiency, and to gain 800 square feet of floor space formerly occupied by two conveyor type washing machines. The sale of the two machines relieved department overhead of their amortization burden.

Every plant has its individual problems unlike those of other industries, but case histories such as this suggest strongly that the Pennsalt Cleaners may offer great advantages in your own processes. Orthosil was the original heavy-duty cleaner in the Pennsalt line. Companion cleaners, meeting each need with laboratory precision, were developed for varied and extreme requirements.

They offer exceptional dissolving and emulsifying action; tremendous lasting power; and quick efficient cleaning ability. One or more Pennsalt Cleaners can earn a money-saving place in your processes. Why not make a test? Write Dept. E and we will furnish full details. Pennsalt Cleaner Division, Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.

PENNSALT

CLEANERS FOR INDUSTRY

★ ★ ★

Other Pennsylvania Salt Chemical Products used in large quantity by industry

ANHYDROUS FERRIC CHLORIDE • SAL AMMONIAC
CARBON TETRACHLORIDE • SODA ASH • MINERAL ACIDS
CAUSTIC SODA • KRYOLITH • ACID-PROOF CEMENTS

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

Steelworkers' Efficiency, Wages And Output Increase Since 1936

■ EFFICIENCY of steelworkers, as measured by the amount of finished products produced per man-hour worked, increased substantially between 1936 and 1939, which years were fairly close in total output of steel. According to the American Iron and Steel institute, more extensive training of employes by steel companies and the large-scale installation of new machinery and equipment were the main factors in raising average efficiency.

Accompanying the improvement in workers' efficiency was an increase in both average weekly wages and in wages received per ton produced.

During 1939, wage-earning employes in steel companies produced for sale an average of 120 pounds of merchant pig iron and finished steel products per man-hour worked. Their productivity last year was 14 per cent higher than in 1936, when wage earners produced an average of 105 pounds per man-hour.

Weekly wages averaged $29.30 per wage earner in 1939, compared with $26.60 in 1936, while direct wages paid per ton of production rose from an average of $14.40 per ton in 1936 to $15.80 per ton last year.

Average improvement in efficiency of individual workers did not result in a decrease in the total number of workers employed in the steel industry. At the close of last year the number of wage earners working was higher than in any month during 1936, and was within 7 per cent of the industry's all-time peak of employment.

For the year 1939 as a whole, total production for sale of pig iron and steel products was 7 per cent below the total in 1936. The average number of wage earners employed during the year, however, was only 6 per cent less than the 1936 average.

Scrap Consumption Off 19 Per Cent in February

■ Domestic consumption of iron and steel scrap declined 19 per cent in February to 3,054,000 gross tons, according to the Institute of Scrap Iron & Steel Inc., New York.

This compares with 3,775,000 tons melted in January, and 2,313,000 tons in February, 1939.

In the first two months of this year domestic consumption of scrap has totaled 6,829,000 tons, against 4,808,000 tons in the corresponding period of 1939, and 2,637,000 tons in the same period of 1938.

Exports of iron and steel scrap continue to decline, the January total of 187,457 being the smallest in 16 months, or since September, 1938.

Diesel Engine Exports Make Slight Increase

■ Diesel engine exports in 1939 were valued at $3,124,679, a slight increase over the preceding year, $3,097,915, according to the machinery division, department of commerce. Stationary and portable types accounted for 78 per cent in 1939 and 69 per cent in 1938. The remainder consisted of marine diesels, which dropped sharply in 1939.

Stationary and portable types increased 15 per cent over 1938. Soviet Russia was the leading buyer, taking $589,137 worth in 1939 and $495,433 worth in 1938. Canada was second largest buyer, $298,108 in 1939 and $255,097 in 1938. The Philippine Islands were third, but their purchases of $267,877 in 1939 were below the $284,540 total in 1938. Most of the remainder went to Latin American markets.

Marine diesel exports declined 31 per cent, from $972,602 in 1938 to $672,194 in 1939. This was owing mainly to smaller purchases by Canada, Japan and Venezuela. Exports to Latin America, on the other hand, showed an increase.

U. S. Used 94 Per Cent Of 1939 Steel Output

■ During 1939 the United States consumed a greater share of the iron and steel produced here than in either of the two preceding years, according to the American Iron and Steel institute.

Home markets last year accounted for 94 per cent of the pig iron and steel products shipped by the steel industry to its customers. In 1938, about 92 per cent of the nation's iron and steel output was for domestic consumption, and 93 per cent in 1937.

Although iron and steel exports, excluding scrap, were relatively heavy in 1939, amounting to about 2,799,000 net tons, they were more than one million tons less than in 1937. Total exports in 1937 were about 3,892,000 net tons, and 1938 exports were 2,407,000 tons.

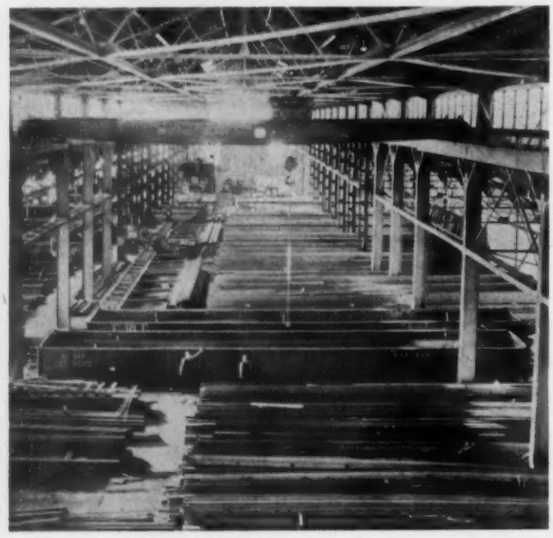
Asia, including Australasia, in 1939 was again the largest foreign market for the nation's iron and steel.

Last year 26 per cent of total exports went to Asia, compared with 24 per cent to Europe. By comparison, Asia and Australasia consumed 40 per cent of 1938 exports and European nations accounted for 20 per cent.

South American nations together consumed 20 per cent of 1939 exports, considerably more than in 1938 when 15 per cent went to those countries.

Canada took 15 per cent last year, as against 13 per cent in 1938, while Central America consumed 11 per cent of 1939 exports compared with 8 per cent in 1938. About 4 per cent went to Africa in both 1938 and 1939.

■ Orders received by General Electric Co. during the first nine weeks of 1940 amounted to $66,900,000, compared with $58,900,000 in the same period last year, an increase of 13.5 per cent, President Charles E. Wilson announced.



Warehouse Air-Conditioned

■ Finish on finer steels is protected in this new air-conditioned warehouse with railroad spur and facilities for unloading steels inside building. Temperature is closely controlled to guard against deterioration of stock. It is part of the Joseph T. Ryerson & Son Inc. modernization program in Philadelphia

Current Events in Chicago . . .

By J. F. POWELL, Chicago Editor, STEEL

■ REPORT of the board of directors of Pullman Inc. reveals the company is developing a new type coach-sleeper combining the characteristics of regular sleeping-car facilities with the economy of day-coach travel. Railroads have expressed much interest in the experiment and the cars now being built will soon be completed and ready for testing.

"This coach-sleeper," it is stated, "is designed to offer to the economy-seeking traveler who is not satisfied with the characteristics of coach service for night-time travel, a real sleeper service at minimum charges for transportation and for the reserved accommodation."

It is understood the new type cars, of which two are being completed, will have greater passenger capacity than the standard sleeper, carrying 45 passengers in comfortable day-time accommodations, and at night providing genuine night-time sleeping accommodations. Berths will be arranged, it is reported, in three tiers rather than the conventional two.

Move to provide lower-cost sleeper service is prompted by the fact that competition, such as air and bus, as well as fast, long-distance day-coach trains run by the railroads themselves, has arisen to curtail Pullman travel. Much of this lost traffic, it is felt, can be reclaimed by the advent of the new sleeper-coaches.

♦

Mechanically Guided Plowing

"Automatic farming," made possible by the use of the tractor, has been the dream of a number of farmers who envisioned themselves basking idly in the sun, or even sleeping peacefully through the night, while their tractors, untended by human hands, roared on, automatically plowing, rolling, sowing or even harvesting.

According to the Chicago *Tribune*, a downstate farmer has developed a set-up that actually makes such labor-saving possible, though previous and even patented "automatic" devices have failed to work. Involved is not a mechanical or electrical robot, but merely the attaching of a tractor to a wire leading to a drum in the center of the field.

The tractor is started on a spiral path and is guided gradually inward to the drum as the wire winds around it, eventually bringing it to a stop. Or, the tractor can be started at the drum, with the wire unwinding to let it work gradually to the outer rim of the circular field. Length of the wire naturally determines the circumference of the field, while diameter of the drum determines the spacing between rows.

Equipment Inexpensive

Known as spiral or phonograph-groove farming, the farmer has little to do but get the tractor started on its way and go about his other duties. Cost of the equipment to steer the tractor automatically is nominal, in this case only $10. Frank W. Andrew of Palmyra, Ill., who developed the device, has left his tractor to work unattended for hours at a time, both day and night. He has plowed and planted three circular fields of oats and eight of corn and plans to continue farming in circles.

System, however, is not flawless, as in a case when a plow gets clogged, nor is it believed suitable for rolling terrain. The automatic steering also will not work on some types of tractors. Mr. Andrew's experiments, however, have proved the practicability of automatic farming and have aroused considerable interest in its applications in the future. The day is foreseen when spiraling devices are manufactured commercially, enabling the growing number of tractor users to indulge in "automatic agriculture."

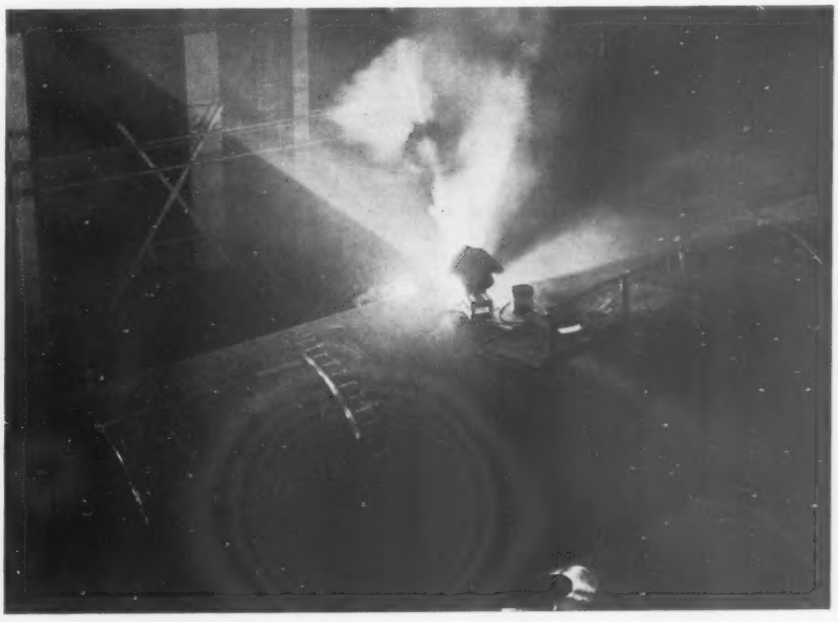
What happens to the pieces of land left over between the circles? They're planted with hay or soy beans.

1939 Air Conditioning Exports up 27 Per Cent

■ Air conditioning equipment exports in 1939 reached a total value of $2,134,655, a gain of 27 per cent over $1,685,141 in 1939, the machinery division of the department of commerce reports. Self-contained units constituted about one-third of the trade both years.

Asiatic markets took about 44 per cent of all exports in this class, Iran being the best individual customer. Its purchases were valued at $288,126, compared with $95,403 in 1938. Canada, usually best market for air-conditioning equipment, dropped to second place in 1939, with shipments valued at $204,181, compared with $227,942 in 1939. Latin American markets took this equipment to the value of $504,310, compared with $311,252 in 1938. Shipments to Europe totaled $227,115, against $205,810 in 1938, Great Britain's purchases totaling $108,771, compared with $66,208 in 1938.

Milwaukee Scene—Where Acetylene Group Meets



■ International Acetylene association has scheduled its fortieth annual convention, April 10-12, at Schroeder hotel, Milwaukee, a city becoming increasingly important as a steel fabricating and consuming center. Detailed program will appear in April 1 issue of STEEL. Perhaps typical of fabricating operations in Milwaukee is the welding of a large pressure vessel, pictured here, in the A. O. Smith Corp. plant

EDITORIAL

More Cockeyed Economics

■ BRIGHTEST of recent cockeyed economic gems is Senator O'Mahoney's proposed amendment to the internal revenue code, involving the establishment of a "labor differential." It would "reward those employers whose output is secured by the more-than-average use of man-power" and penalize those employers whose plants are mechanized by "requiring a contribution" from those "whose output is produced by more-than-average use of machine power."

Certain fundamental economic facts are overlooked or blandly ignored by the senator. One is that employment in manufacturing plants can be created or sustained only in conformity with the volume of consumer acceptance of the manufactured product. That, in turn, depends to a large extent on the price that the manufacturer asks for his product. Much as the housewife, for example, desires an electric refrigerator, a radio set, new furniture, she can fulfill these desires only as permitted by her buying ability. If prices are reasonably low, she can buy more products and create larger employment at the manufacturing plants. If prices are high, she buys less and creates less employment.

Specific Cases Prove Double Action Of Machinery—More Jobs, Lower Prices

In February of 1938 William J. Cameron of the Ford Motor Co. discussed machine versus manual methods in the classic case of the inner shell of the hubcap of a Ford car. Shaped in dies costing $13,328, in an automatic press costing $30,770, the cost of this part was 12 cents. To produce this part by hand would have required the labor of 2160 men, each equipped with $24 worth of hand tools, with a resulting cost of $2.50 per piece. Mr. Cameron then went on to show how the adoption of this method of production throughout would have raised the cost of a Ford 1938 model to $17,850. He pointed out that very few cars could have been sold at such a price, so that a substitution of hand for machine methods would have destroyed employment rather than created more employment.

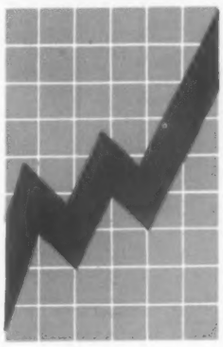
"Three million men are normally employed in making and servicing cars, *because* with machinery cars can be produced at wages that enable people to buy. And that, in turn, creates jobs at wages that enable people to buy. The cars, the jobs, the wages would not be there, were it not for machinery. From its very inception, down to the last turn of its wheels, *industrial machinery creates employment,*" concluded Mr. Cameron.

Unsound Proposals Point Need for Continued Education on Economic Facts

The scheme is just another one of the many aimed at taking away from the "haves" to give to the "have-nots." The mountain of the temporary national economic committee has labored and brought forth another proposal to redistribute the national income, based on the conception that such prosperity as we have is all we can expect, that industrial expansion belongs to the past and not the future.

Fortunately, there is small possibility that Senator O'Mahoney's proposal ever will be enacted. It constitutes another reflection of the fact, however, that too many people still hold unsound and dangerous views in connection with our national economy. It shows that there can be no relaxation in the effort to enlighten public opinion as to what sort of a national policy in reference to business is necessary before the unemployment problem can be solved.

The *BUSINESS TREND*



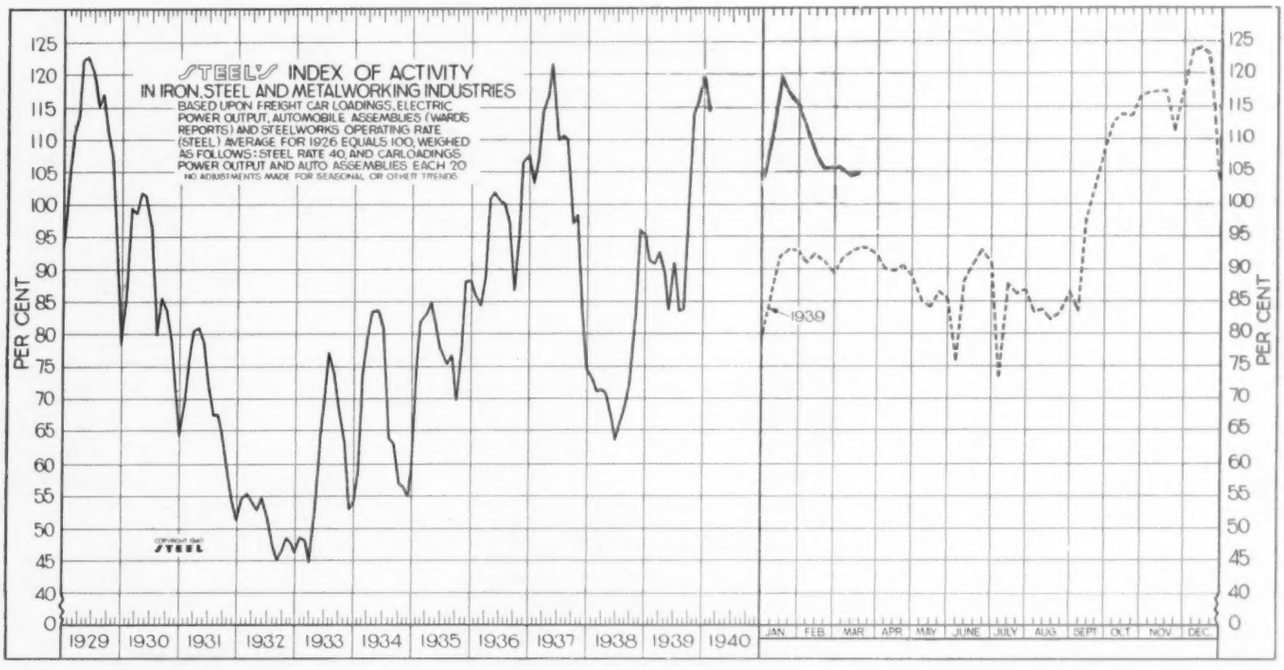
Activity Index Leveling Off at 105 Level

■ Mixed trends continue to dominate industrial activity. The normal seasonal influences have not yet proved strong enough to bring about a broad reversal of the downward tendency.

Milder decreases in operations and scattered evidence of improved buying in some lines appear to indicate that the sharp downtrend of business activity through January and February is leveling off. In sharp contrast with the showing in most industrial lines since the close of the year, is the near capacity operations maintained in the shipbuilding, aircraft and machine tool industries.

Reflecting the encouraging seasonal improvement in automobile production during the week ended March 16, STEEL's index edged upward to 104.9. This represents a gain of 0.2-point over the level recorded in the previous week and compares favorably with 93.3 reported in the corresponding week last year.

Minor declines in revenue freight carloadings, electric power consumption and steelmaking operations were recorded during the latest period.


STEEL INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARDS REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100; WEIGHED AS FOLLOWS: STEEL RATE 40 AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
1939
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

STEEL'S index of activity gained 0.2 point to 104.9 in the week ended March 16:

Week Ended	1940	1939
Jan. 13	119.2	91.9
Jan. 20	117.3	93.0
Jan. 27	115.4	92.9
Feb. 3	111.6	90.7
Feb. 10	107.2	92.1
Feb. 17	105.1	91.1
Feb. 24	105.4	89.3
Mar. 2	105.6	91.5
Mar. 9	104.7	92.7
Mar. 16	104.9	93.3

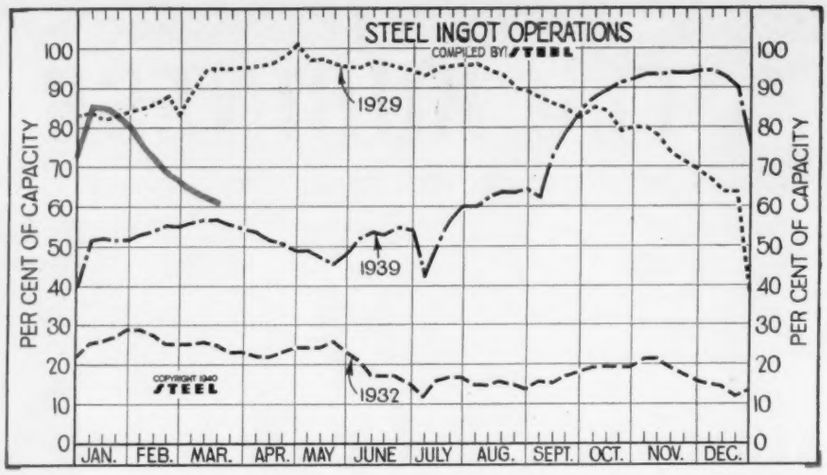
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	.....	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	.....	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	.....	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	.....	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	.....	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	.....	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	.....	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	.....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

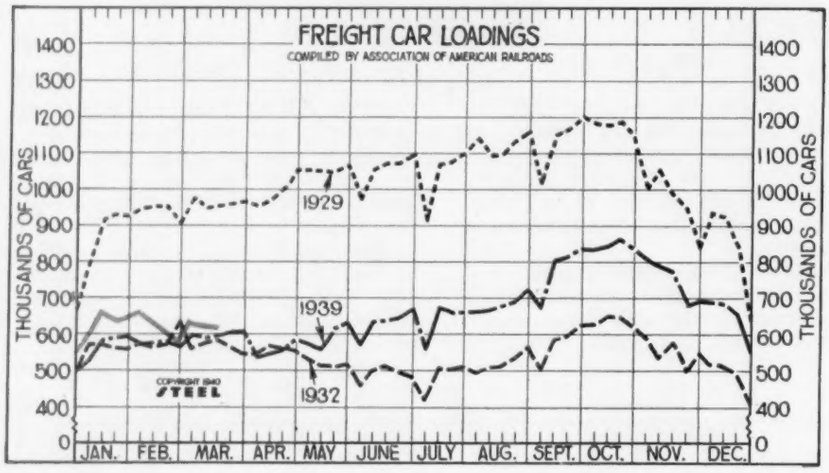
Steel Ingot Operations

(Per Cent)

Week ended	1939	1938	1937
Dec. 16	92.5	58.0	27.0
Dec. 23	90.5	52.0	23.0
Dec. 30	75.5	40.0	21.0

Week ended	1940	1939	1938	1937
Jan. 6	86.5	51.5	26.0	79.5
Jan. 13	86.0	52.0	29.0	79.0
Jan. 20	84.5	51.5	30.5	80.0
Jan. 27	81.5	51.5	33.0	76.0
Feb. 3	76.5	53.0	31.0	79.5
Feb. 10	71.0	54.0	30.0	81.0
Feb. 17	69.0	55.0	31.0	83.0
Feb. 24	67.0	55.0	30.5	84.0
Mar. 2	65.5	56.0	29.5	86.0
Mar. 9	63.5	56.5	30.0	87.0
Mar. 16	62.5	56.5	32.0	90.0





Freight Car Loadings

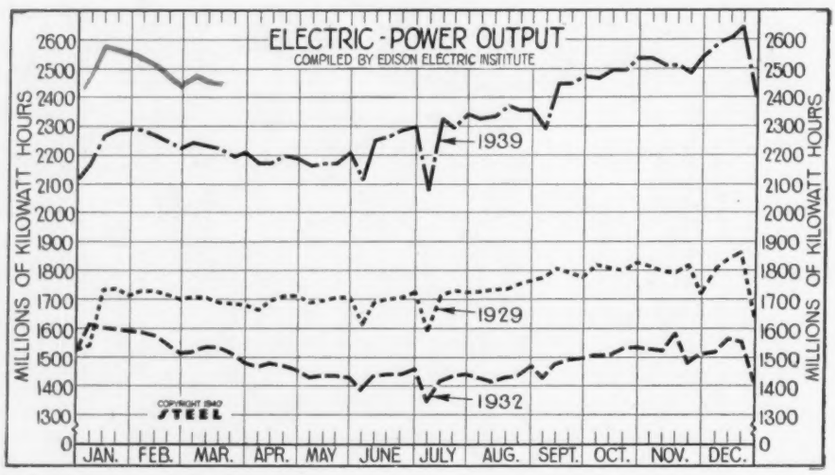
(1000 Cars)

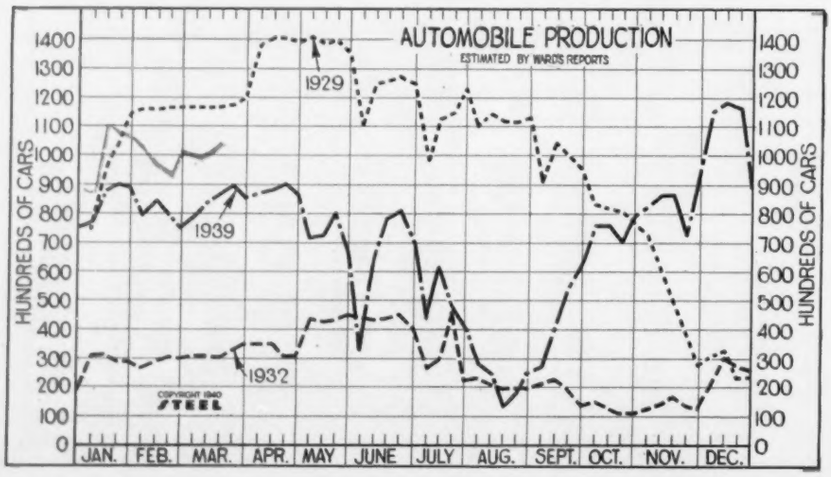
Week ended	1940	1939	1938	1937
Dec. 16		681	606	603
Dec. 23		655	574	460
Dec. 30		550	500	457
Jan. 6	592	531	552	699
Jan. 13	668	587	581	700
Jan. 20	646	590	570	670
Jan. 27	650	594	553	660
Feb. 3	553	577	565	675
Feb. 10	627	580	543	692
Feb. 17	608	580	536	715
Feb. 24	595	561	512	697
Mar. 2	634	599	553	734
Mar. 9	621	592	557	749
Mar. 16	619	595	540	761

Electric Power Output

(Million KWH)

Week ended	1940	1939	1938	1937
Dec. 16		2,605	2,333	2,202
Dec. 23		2,641	2,363	2,085
Dec. 30		2,404	2,121	1,998
Jan. 6	2,473	2,169	2,140	2,244
Jan. 13	2,593	2,270	2,115	2,264
Jan. 20	2,572	2,290	2,109	2,257
Jan. 13	2,566	2,293	2,099	2,215
Feb. 3	2,541	2,287	2,082	2,201
Feb. 10	2,523	2,268	2,052	2,200
Feb. 17	2,476	2,249	2,059	2,212
Feb. 24	2,455	2,226	2,031	2,207
Mar. 2	2,479	2,244	2,036	2,200
Mar. 9	2,464	2,238	2,015	2,213
Mar. 16	2,460	2,225	2,018	2,200

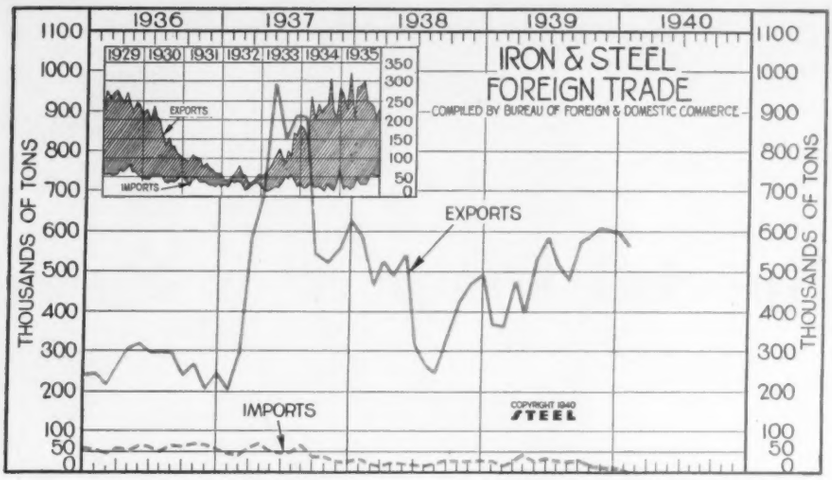




Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
Dec. 16		118.4	102.9	82.0
Dec. 23		117.7	92.9	67.2
Dec. 30		89.4	75.2	49.6
Jan. 6	87.5	76.7	54.1	96.8
Jan. 13	111.3	86.9	65.7	91.7
Jan. 20	108.5	90.2	65.4	81.4
Jan. 27	106.4	89.2	59.4	74.1
Feb. 3	101.2	79.4	51.4	72.3
Feb. 10	96.0	84.5	57.8	72.8
Feb. 17	95.1	79.9	59.1	95.7
Feb. 24	102.6	75.7	57.0	111.9
Mar. 2	100.9	78.7	54.4	127.0
Mar. 9	103.6	84.1	57.4	101.7
Mar. 16	105.7	86.7	57.5	101.0



Iron and Steel Foreign Trade

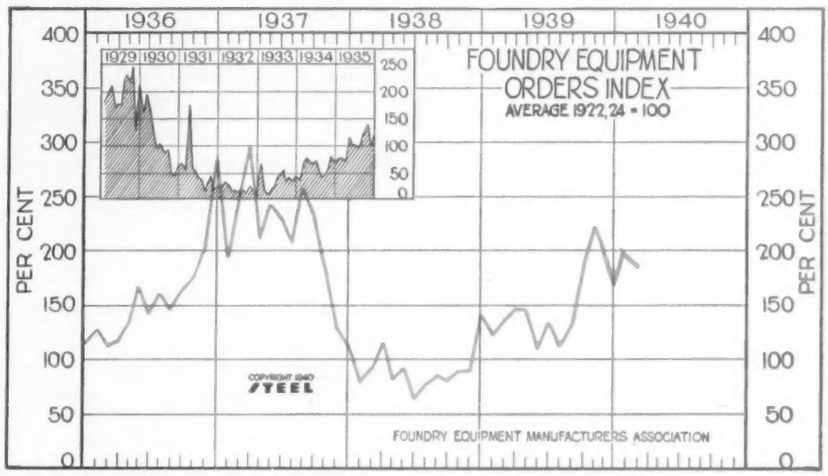
(Thousands of Tons)

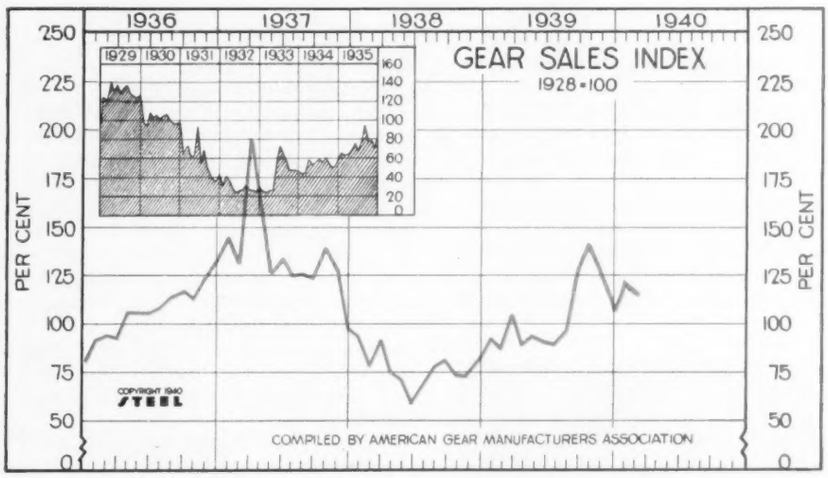
	Exports			Imports		
	1940	1939	1938	1940	1939	1938
Jan.	583.6	362.7	586.3	8.3	27.7	29.6
Feb.	.....	359.7	460.6	...	19.1	19.6
Mar.	.....	474.4	526.9	...	25.4	11.8
April	.....	394.0	489.2	...	44.1	21.2
May	.....	532.6	540.6	...	28.1	20.8
June	.....	588.9	312.0	...	32.6	15.9
July	.....	513.7	263.7	...	30.8	14.7
Aug.	.....	477.1	242.1	...	28.3	20.0
Sept.	.....	575.6	346.1	...	29.9	28.0
Oct.	.....	591.9	425.4	...	19.2	26.4
Nov.	.....	605.6	6.46.2	...	15.2	27.6
Dec.	.....	600.4	490.1	...	14.7	28.8
Tot'l.	.....	6076.4	5152.7	...	315.2	264.6

Foundry Equipment Orders Index

1922-24 = 100

	1940	1939	1938	1937	1936
Jan.	197.9	122.3	76.8	190.9	127.0
Feb.	179.4	135.3	90.4	249.5	110.4
Mar.	....	146.6	114.6	294.2	115.0
April	.....	146.0	79.3	208.3	134.0
May	....	108.8	90.6	242.0	165.4
June	...	134.6	61.2	228.2	141.4
July	....	111.9	74.2	204.0	159.5
Aug.	...	131.4	83.3	257.5	144.8
Sept.	...	184.4	78.7	231.8	161.0
Oct.	...	220.4	87.9	185.2	173.8
Nov.	...	203.1	89.7	128.0	200.4
Dec.	....	164.8	141.8	111.2	283.3
Ave.	.....	150.8	89.4	210.9	159.7





Gear Sales Index

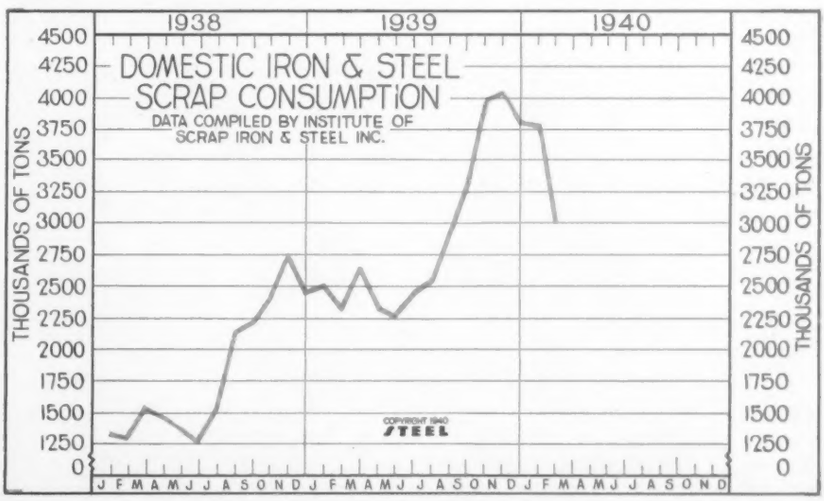
(1928 = 100)

	1940	1939	1938	1937	1936
Jan.	123	91.0	93.0	144.0	90.5
Feb.	116	86.0	77.0	130.5	93.0
Mar.	.....	104.0	91.0	195.0	92.0
April	.....	88.0	74.0	164.0	105.0
May	.....	93.0	70.0	125.5	105.0
June	.....	90.0	58.0	134.0	105.0
July	.....	89.0	67.0	124.0	107.5
Aug.	.....	96.0	76.5	125.0	113.0
Sept.	.....	126.0	80.5	123.0	115.5
Oct.	.....	141.0	72.5	139.5	112.5
Nov.	.....	126.0	72.0	127.5	122.5
Dec.	.....	111.0	81.0	97.0	132.5
Ave.	.....	103.5	76.0	135.5	107.5

Iron and Steel Scrap Consumption

Gross Tons

	1940	1939	1938
Jan.	3,775,000	2,495,000	1,332,000
Feb.	3,054,000	2,313,000	1,306,000
Mar.	.....	2,634,000	1,543,000
Apr.	.....	2,317,000	1,477,000
May	.....	2,263,000	1,387,000
June	.....	2,428,000	1,257,000
July	.....	2,551,000	1,520,000
Aug.	.....	2,919,000	2,133,000
Sept.	.....	3,282,000	2,218,000
Oct.	.....	3,974,000	2,393,000
Nov.	.....	4,025,000	2,740,000
Dec.	.....	3,805,000	2,441,000
Total ...	.....	35,006,000	21,746,000


1938
1939
1940
DOMESTIC IRON & STEEL
SCRAP CONSUMPTION
DATA COMPILED BY INSTITUTE OF
SCRAP IRON & STEEL INC.
THOUSANDS OF TONS
COPYRIGHT 1940 STEEL
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

Developing Special Properties By Heat

When annealing is stopped before all combined carbon is changed to temper graphite, malleable irons are produced with certain steel characteristics due to that portion of carbon retained in original combined form

■ AMERICAN malleable cast iron as an engineering material has retained a prominent position in industry throughout the years. Its principal users have been the railroad, agricultural implement and automotive industries. Requirements have shifted back and forth considerably as users have changed from malleable iron to other materials, only to find later still other uses to which malleable iron was especially adapted.

In these days, materials are being minutely examined in all branches of industry. Engineers are faced with many problems which require materials possessing definite physical characteristics, often unusual requirements in terms of well-known materials. Thus well-known materials must be re-examined from time to time to find if they possess potential characteristics which may render them suitable for these special engineering requirements.

A survey of potential properties of materials producible from a malleable iron base by suitable heat treatment reveals an unusually large range of great value to the engineer interested in obtaining materials suitable for unusual and exacting services.

It is intended to point out here the variety of products that can be made by the malleable iron founder. It is not intended to deal specifically with malleable cast iron of the conventional type, since this material is well known and has its own distinctive field. Usual black heart American malleable cast iron is essentially pure iron with nodular graphite dispersed throughout the metal structure.

It is not commonly understood that this particular form of graphite is produced by heat treatment and that it is not present in the metal as cast. When made into castings, the original hard iron contains 2.5 per cent of more carbon in the combined form and the metal is free from graphite. During heat treatment, this combined carbon is changed to temper graphite in a progressive manner. During annealing, combined carbon becomes less and less until finally it is completely decomposed into iron and temper graphite, characteristic of the usual well-known metal (malleable iron).

Thus it is significant that the iron matrix changes its composition from one containing at least 2.5 per cent combined carbon to one containing progressively less and less combined carbon as heat treatment is continued.

By regulating heat treatment, it thus is possible to produce a material of almost any desired combined-carbon content. It is the presence of various amounts of combined carbon which distinguishes the different steels from each other. With this steel struc-

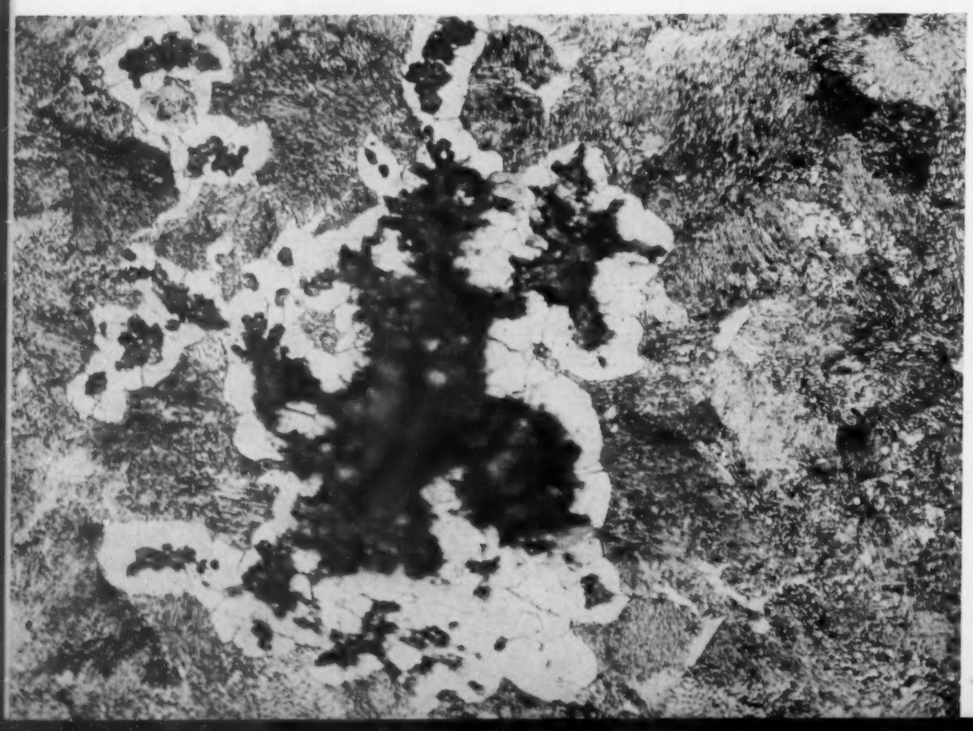
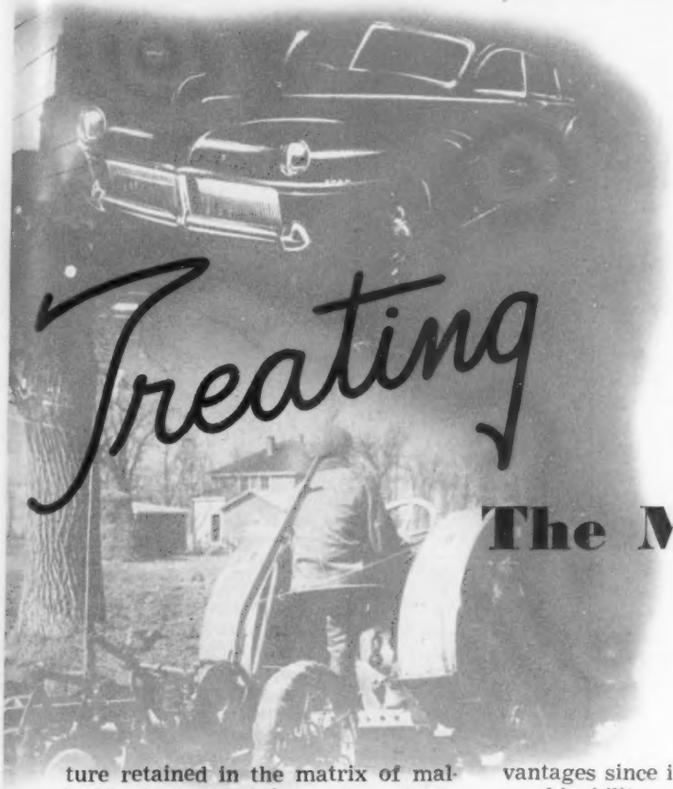


Fig. 1—Typical malleable iron grain size, at 500 diameters. Dark portions are graphite nodules in ferrite matrix



Treating The Malleable Irons

By R. J. COWAN
Metallurgical Engineer
Surface Combustion Corp.
Toledo, O.

ture retained in the matrix of malleable iron, a variety of products having a steel base of definite carbon content are possible. These, in turn, may be heat treated in a manner similar to steels of corresponding carbon content.

It is doubtful if engineers concerned with the utilization of metals fully understand and appreciate range of properties available in such heat-treated malleable iron.

The term "heat-treated malleable" will be used here to cover metals with this range of properties made possible by heat treatment of a malleable iron base metal. Only slight attention will be paid to effects of alloys on the base metal since such considerations would enlarge this presentation beyond the scope intended.

A number of distinctive properties belong to all heat-treated malleables. They contain graphite in temper-carbon form, uniformly dispersed throughout the metal section, whatever the combined-carbon content of the matrix may be. For instance, if 0.5 per cent carbon is present in the combined form, 2.0 per cent or more carbon in temper-graphite form will be found. Difference between combined-carbon content of the matrix and the original hard iron always will be temper graphite of characteristic form.

This, of itself, offers certain advantages since it decidedly improves machinability and also supplies an internal reservoir of carbon tending to maintain uniformity of metal composition during heat treatment. This is a distinctive characteristic and consequently offers advantages not found in any other commercial product.

Grain Size Controlled

Concerning response to heat treatment, attention is called first to the various sizes of temper carbon particles found in the iron. These vary from large nodules widely separated from each other to small finely divided particles dispersed throughout. Iron containing graphite as fine temper carbon characterizes a metal with rapid annealing characteristics. This is understood readily as formaton of these carbon nodules is dependent upon diffusion of carbon from combined carbon of the metal base to a carbon particle. The greater the number of particles of temper graphite in the structure, the less the time required for complete diffusion (complete annealing). Malleable iron of usual commercial grade varies in carbon size from one manufacturer to another and very frequently from heat to heat.

Grain sizes of metals of industrial importance have received a lot of careful study and investigation for a long time. The custom of specifying coarse or fine grained

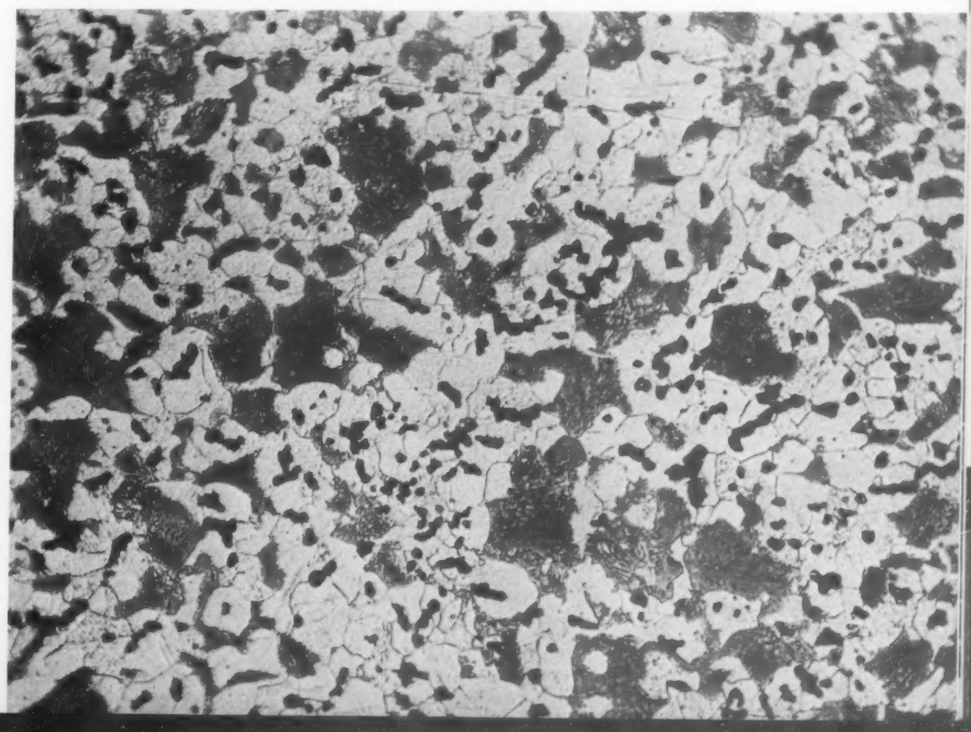


Fig. 2—Partially annealed malleable, also at 500 diameters, showing smaller grain size than Fig. 1. This iron is more fully annealed than the ordinary pearlistic malleables

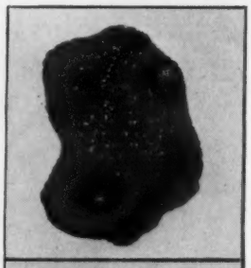
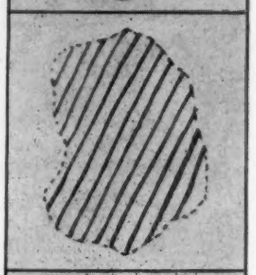
Mechanical Properties of Mass	Microstructure	Segregation Stages
Maximum tensile stress about 70 tons per square inch. Elongation on 2 inches = about 10 per cent.		1ST PHASE "Sorbitic" pearlite with emulsified Fe_3C. Very dark on etching.
Maximum tensile stress about 55 tons per square inch. Elongation on 2 inches = about 15 per cent.		2ND PHASE Normal pearlite with semisegregated Fe_3C. Dark on etching.
Maximum tensile stress about 35 tons per square inch. Elongation on 2 inches = about 5 per cent.		3RD PHASE Laminated pearlite with completely segregated Fe_3C. Exhibiting a play of gorgeous colors when lightly etched.
Maximum tensile stress about 30 tons per square inch.		4TH PHASE Laminated pearlite passing into massive Fe_3C and ferrite.

Fig. 3—Properties of pearlite and its decomposition product, from Sauver's Metallography and Heat Treatment of Iron and Steel. In a single section of steel, two or even all three phases of pearlite may be observed gradually merging into each other

materials is well established. Grain size charts facilitate specification of a particular grain size. While grain size is not yet a standard malleable-iron specification, there is a definite relationship between grain size and carbon nodule size. Thus those steps employed by a malleable-iron manufacturer to produce small sized graphitic-carbon nodules will at the same time produce a fine grained malleable iron with the physical properties of a fine grained metal.

Carrying this idea of grain size over into the field of the so called pearlitic malleables where the base metal retains some combined carbon, it is possible to make use of the usual conception of effect of grain size upon hardenability. The steel man frequently refers to a coarse grained steel as being deep hardening, whereas a fine grained steel is shallow hardening. These same general observations also will be true of pearlitic malleable since the base metal in this case is a hardenable steel of medium or high carbon content with temper graphite dispersed throughout the structure. It will respond to heat treatment as would a steel of like combined-carbon analysis.

It will be recognized at once that the property of deep hardening or shallow hardening is of great importance in heat treating machine parts intended for wear or shock resistance. A proper utilization of these characteristics makes it possible to produce a casting with good machinability although having a carbon content high enough to produce high hardness when quenched from high temperature. At the same time, the core structure of the metal retains the high degree of resilience and resistance to shock so essential for many engineering requirements.

With a fine grained metal, hardening action is confined to a comparatively shallow case, equal or superior to usual case-hardened steel. At the same time, the desirable properties of a satisfactory core are retained.

Different grain sizes producible

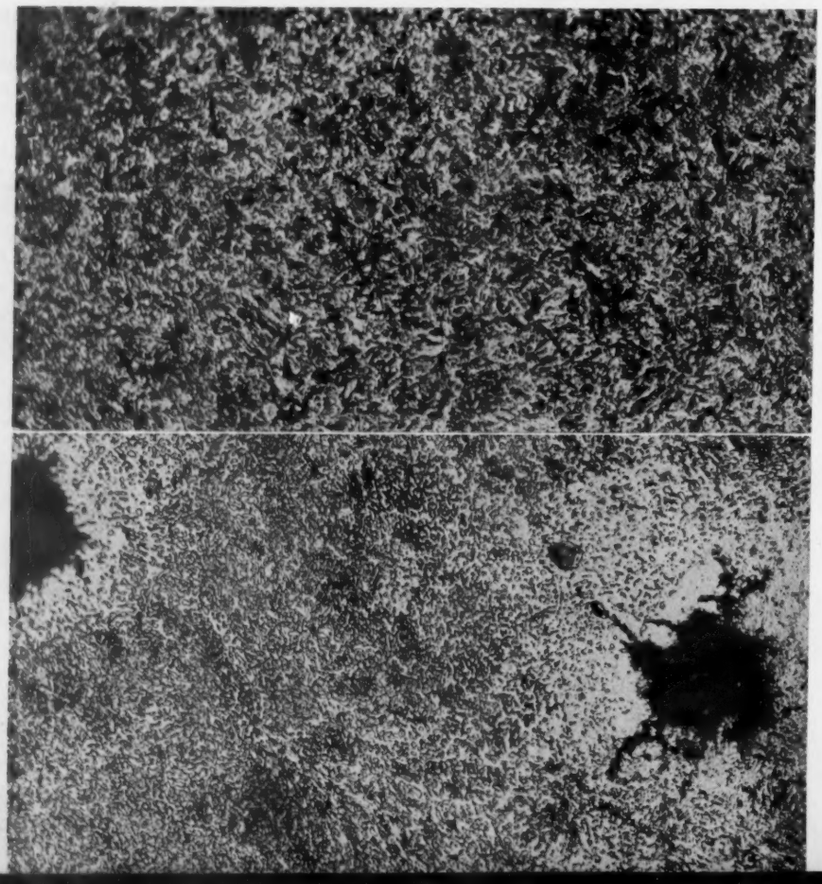


Fig. 4. (Upper)—Microstructure of hardened portion of camshaft showing spheroidal cementite

Fig. 5. (Lower)—Unhardened portion of camshaft shown in Fig. 4

in malleable iron by suitable heat treatment are illustrated in Figs. 1 and 2. A typical malleable grain size is shown in Fig. 1 at 500 diameters. In Fig. 2 is a special malleable at same magnification. This has smaller sized grain with finer dispersion. Material in Fig. 2 is not fully annealed as is readily apparent by presence of pearlite in the matrix. However, it is more fully annealed than usual pearlitic malleable types.

Structure of Pearlite

A heat-treated malleable iron will have a pearlitic matrix in a variety of forms depending upon treatment. Importance of this will be recognized when it is remembered that each of these forms has distinctive characteristics. In the sorbitic form, the carbide is emulsified with the iron so thoroughly that it obscures the structure when examined under a microscope in the usual way. This form of pearlite is said to have a tensile strength of 140,000 pounds per square inch and an elongation in 2 inches of about 10 per cent.

A second phase has the normal pearlitic form comprising fine carbide striations. Maximum tensile strength is about 110,000 pounds per square inch. Elongation in 2 inches is about 15 per cent.

A third form is the usual lamellar pearlite in which carbide exists as well developed laminations. Tensile strength is about 70,000 pounds per square inch. Elongation in 2 inches is about 5 per cent.

A fourth phase contains the carbide in a massive form tending toward the spheroidal. Here tensile strength is about 60,000 pounds per square inch. The information just given is taken from Sauveur, *The Metallography and Heat Treatment of Iron and Steel.* Fig. 3, reproduced from this book, summarizes this information and illustrates the forms of pearlite just mentioned.

It is desired to point out specifically that these well-known and clearly recognized forms of pearlite are to be looked for also in heat-treated malleables. Base metal of these materials can be made to contain pearlite in any desired form with the additional feature of having temper graphite dispersed throughout. As a result of these characteristics, the malleable iron manufacturer can produce a material with physical properties variable throughout a wide range by means of suitable heat treatment to modify properties of the base metal.

It is customary practice in heat treating high-carbon steel to use a treatment causing the combined carbon to separate as spheroidal particles. Structure of such a steel then will consist of these spheroids embedded in a matrix of iron so the hard carbon particles are dispersed throughout a ground mass of soft iron. This makes the metal somewhat ductile and readily machinable so it may be worked and formed easily.

A further characteristic found in heat treating this material is the comparative ease with which spheroids of carbon will dissolve in the iron when reheated to a suitable temperature. This permits entire carbon content of the metal to be brought into solution again and made suitable for hardening or other purposes.

The malleable iron manufacturer can produce a metal with a spheroidized base containing carbon also in the form of temper graphite distributed throughout. Size of spheroids produced can be controlled to some extent to affect considerably the physical properties of the metal. This is somewhat similar to the various pearlite structures as smaller and more finely dispersed spheroids increase tensile strength, lower elongation. Larger spheroids make metal more ductile with lower tensile strengths and higher elongation.

A metal of this type responds readily to hardening treatments. With spheroids of carbon readily dissolving when heated, it is possible to harden so only a few spheroids dissolve. Remainder persists as a strengthening and supporting element in the structure.

This is significant as much less than 1 per cent carbon will produce any degree of hardness desired. Consequently, more spheroids may be available than required. These will increase wear resistance of the hardened surface in the manner suggested. The ease with which these spheroids dissolve when heated makes it possible to harden selected portions of a piece while retaining the properties of the original metal.

The spheroidal structure is influenced strongly by presence of alloys in the base metal, even in small amounts. As in steel, these alloys impart specific properties and are useful for this purpose. It is not necessary to use them, however, to obtain the advantages of spheroidal carbide forms. These can be produced by heat treatment of hard iron of customary composition. Materials of this type suggest an interesting class of applications which will become increasingly important when their true values are recognized. They are being used at present for various dies and punches, tools of many kinds, pipe fittings, air drills, brake drums and gears. In parts where selective hardening is a factor, these materials will be

(*Please turn to Page* 72)

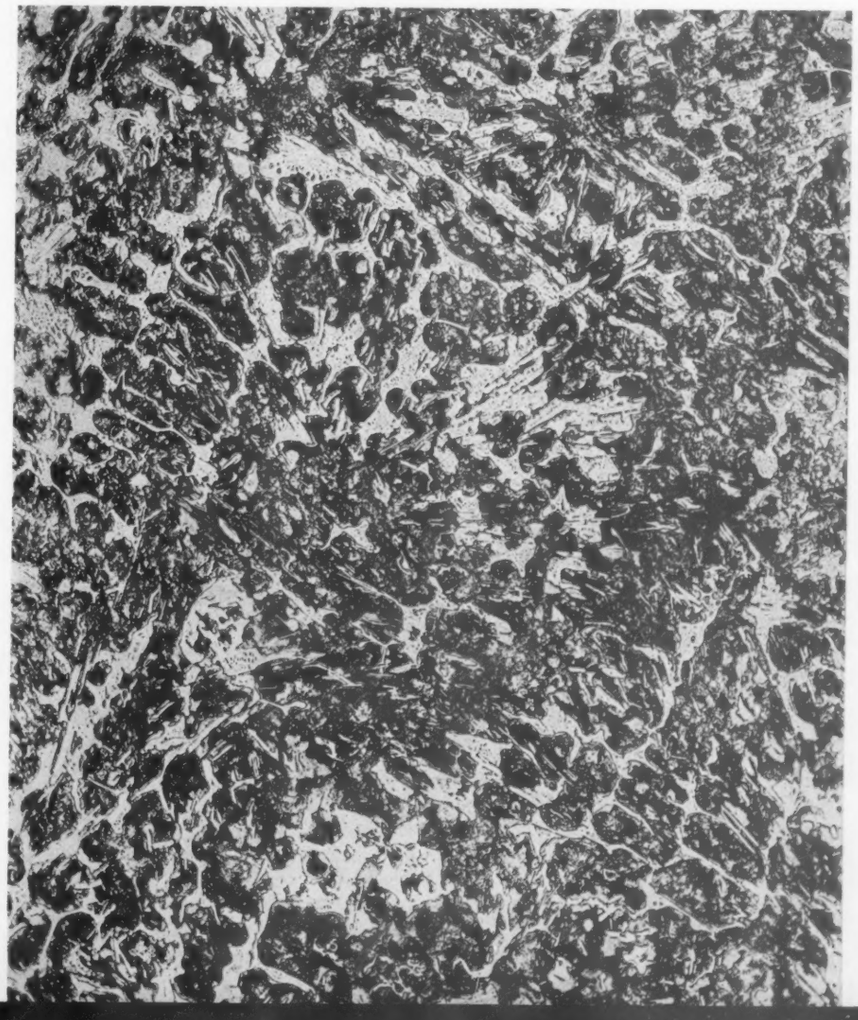


Fig. 6—Structure of malleable iron as cast and before heat treatment. No free carbon present. At 500 diameters

Stainless Steel at LaGuardia Field

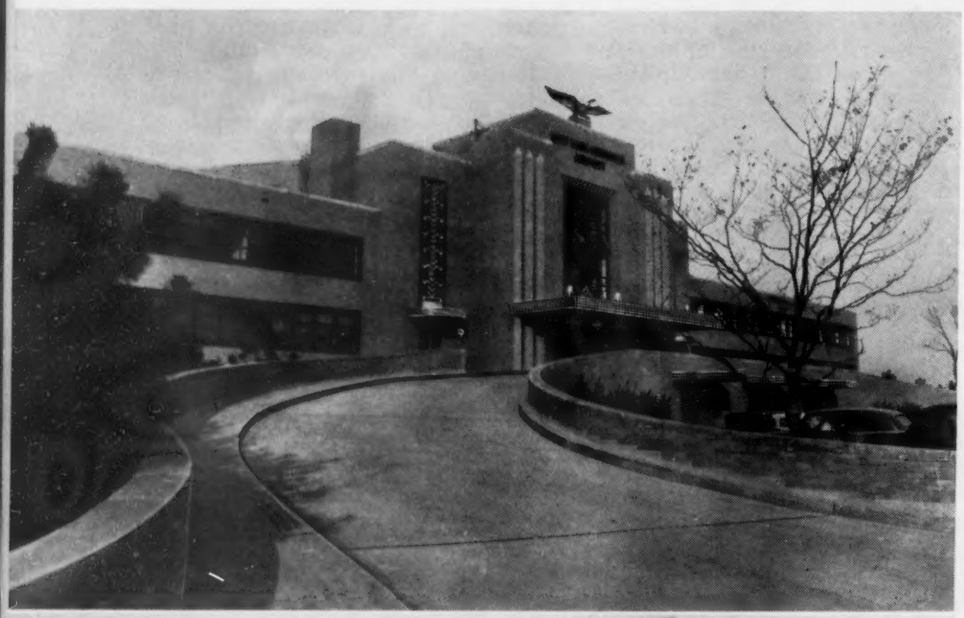
■ NEW YORK's municipal airport, North Beach, Long Island, recently dedicated as LaGuardia field, features thousands of pounds of stainless steel in the nine principal buildings. Accompanying illustrations show a number of points where it is employed.

Airport buildings include more floor space than found in many small cities. Landplane administration building alone surpasses in size union railway terminals of many large citites. Each of the six landplane hangars is about one-half block long. The seaplane hangar with marine terminal building is largest such project in the world.

Landplane administration building, three stories high, is surmounted by a control tower. Exterior and vestibule entrance at both ground level and main floor are stainless with 14 and 12-gage for doors and frames respectively. About 50 such stainless doors are in use at the airport. Above each front entrance is a marquee of stainless with high narrow windows above featuring stainless grilles. Main concourse of administration building is a rotunda with stainless steel trim as molding around ceiling dome and as guards for vertical columns. Many other points feature stainless. Baggage room and facilities for handling mail and express are on the floor below the waiting room. Protective shutters, wear-resistant baggage counters and bright trim are some of the uses for stainless here.

Marquees and entrances to stairs and vestibules of the rotunda employ molding and trim of 20-gage satin-finish stainless held in place with snap-on clips. About 600 feet of stainless steel trim for counters also is held by clips. Much of this stainless is suitably passivated with nitric acid after fabrication.

Landplane hangars 1, 3 and 5 are occupied by American Airlines. Opposite are hangars 2, 4 and 6 used by United Airlines, TWA and Canadian Colonial Airways. These hangars feature stainless in cor-



Top, entrance to seaplane hangar where some 80,000 pounds of stainless is used, a good part of the 200,000 pounds used at this airport

Center, below the eagle, this main entrance is brightened by stainless doors, grilles and marquees

Bottom, travelers embarking on transoceanic aircraft pass into the marine terminal (seaplane administration) building through this entrance beautified by stainless

nices, panels, moldings, etc. Some 1744 specialiy fabricated stainless shapes with total length of 21,000 feet and 18,400 stainless screws are found in hangars 3 and 5 alone.

Seaplane terminal at extreme western portion utilizes stainless to sheathe upper portions and at entrances, window frames and trim. This building houses transoceanic airline ticket and administrative offices, immigration inspectors' quarters with durable counters of thick stainless steel sheet, detention room and quarters for public health service as well as a separate weather bureau.

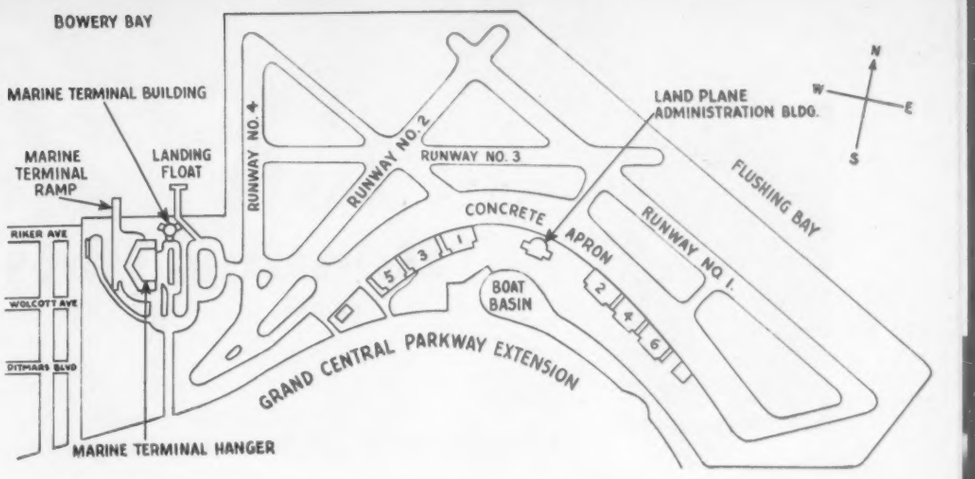
Steel Heavier in Door Frames

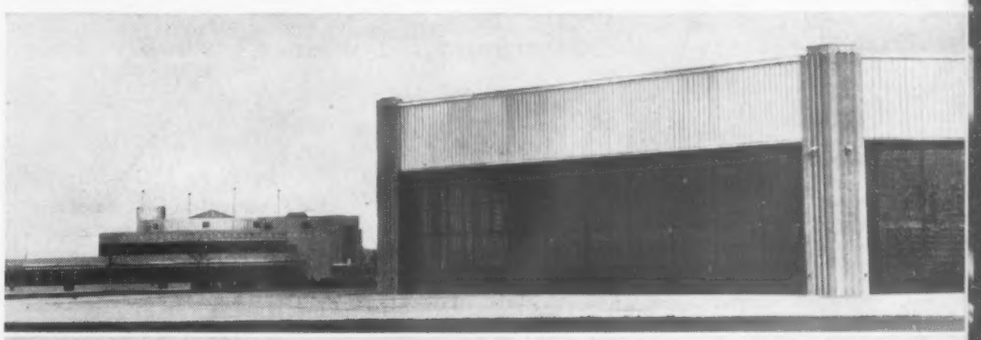
Frames for exterior doors and interior double doors throughout the airport are made from 14-gage, the heaviest used. Thinner metal is employed for door panels, interiors of flush doors, louvers, moldings, muntins and louver frames.

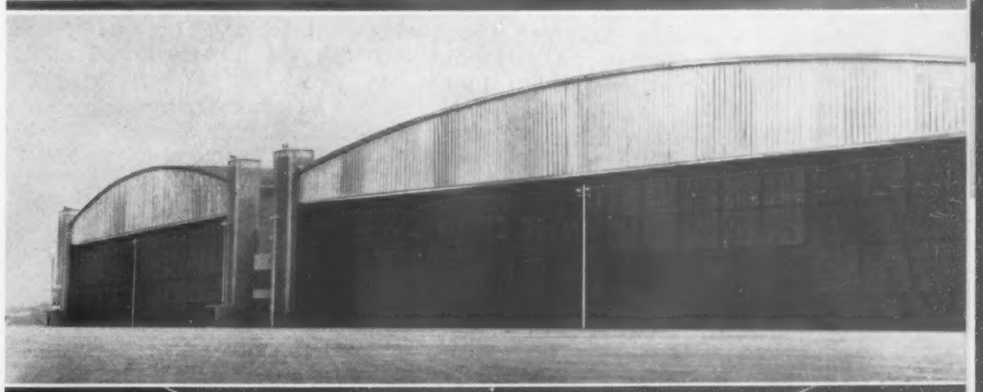
Marine terminal hangar is a 5-sided building large enough to house two regulation-size football fields. Four sides of this building are sheathed with stainless above hangar doors. On fifth side is a beautiful stainless steel entrance. Some 80,000 pounds of stainless are used here.

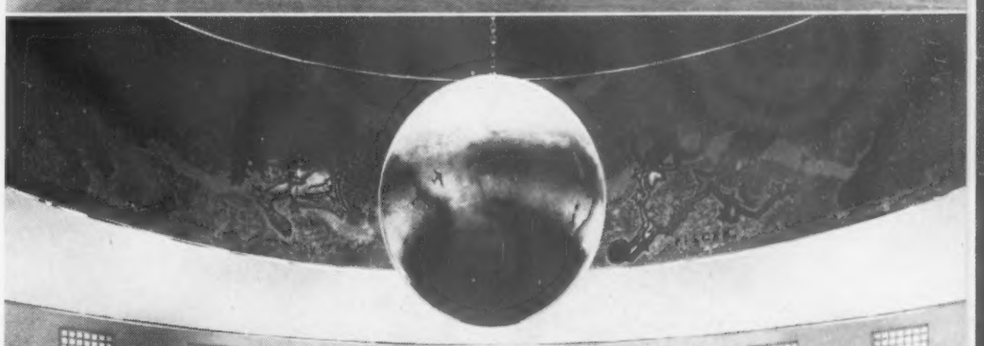
Although it is difficult to give an exact figure, total amount of stainless steel used at the airport is estimated to border on 200,000 pounds.

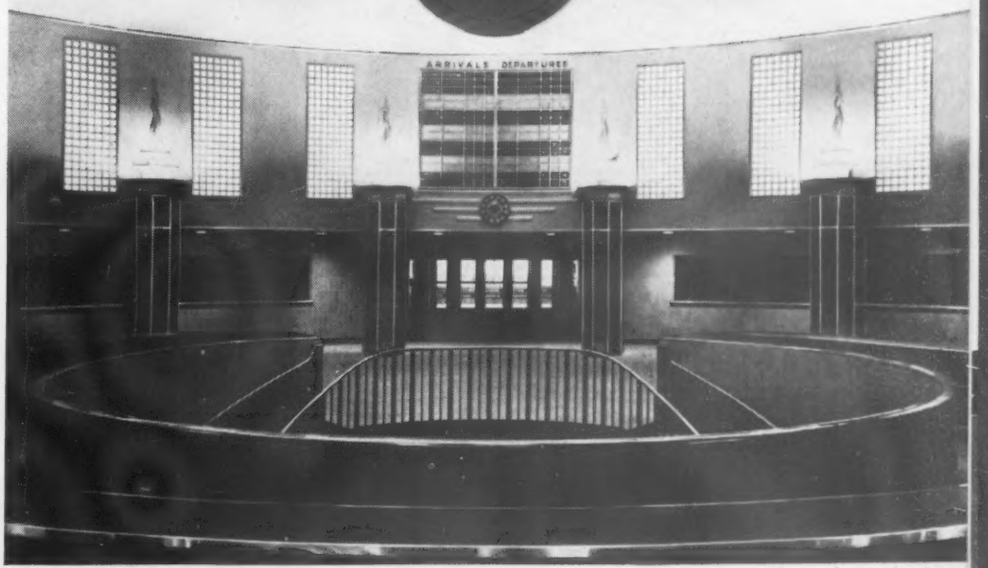
Companies designing, supplying or erecting stainless steel for this airport included: Delano & Aldrich, 126 E. 36th St., New York; Atlantic Metal Products Co., New York; Allied Bronze Corp., Long Island City, N. Y.; Somaron Sheet Metal Works Inc., New York; Superior Bronze Corp., New York; Edward G. Budd Mfg. Co., Philadelphia; General Bronze Co., Long Island City, N. Y.; Atlantis Steel Products Co., Brooklyn, N. Y., T. A. and I. W. Beck.











Top, plan of New York municipal airport, North Beach, Long Island, recently dedicated as LaGuardia field

Next to top, seaplane hangar in foreground and seaplane administration building in distance feature much stainless steel

Next to bottom, stainless cornice pieces for these landplane hangars would cover a path over 4 miles long, employ some 18,000 stainless steel screws for their installation

Bottom, rotunda of landplane administration building displays doors, frames, railings, moldings and counters of stainless. Illustrations courtesy Electro Metallurgical Corp., a unit of Union Carbide & Carbon Corp., 30 East Forty-second street, New York

Routing Raises Output

Detailed work schedules at machine tool builder's plant aid routing and checking production, thus facilitate increased outputs. Flow of work in subassembly, assembly departments always in one direction

PART II

By P. A. ABE
Vice President in Charge of Engineering and Production
Monarch Machine Tool Co.
Sidney, O.

■ HANDLING and control of operations in the assembly department at Monarch Machine Tool Co. Sidney, O., naturally is quite different from that in the machining department, although the work of both necessarily is carefully co-ordinated. Both departments operate on advance monthly schedules—schedules that line up the work in detail for a four-week period ahead. Nevertheless, these schedules allow a great deal of flexibility when there is a sharp rise in orders.

The general foreman of the assembly department works from two master schedules. One controls assembly of individual units such as headstocks, aprons, carriages and tailstocks. The other controls erection of these units into the completed machine. Let us follow through the first-mentioned schedule.

This subassembly schedule shows the serial number of each lathe, its size and type, name of the customer, and lists the various subassemblies that are to be built. It also shows all the "specials" involved, such as special spindle speeds, rapid traverse units, direct length-reading dials, and thread indexing attachments. With this schedule as a guide, the general foreman's office makes out a tag for each unit to be built. These tags identify the unit, give the lathe number, and carry a notation of any special work to be done.

There are five subassembly lines; one each for headstocks, carriages, aprons, tailstocks and attachments. When one of the subassembly line foremen is assigned a job, he puts that job's tag on the main casting and writes the name of the assembler assigned to the work next to the name of the unit on the master schedule. When this particular unit is completed and the assembler comes up for his next tag, his name on the last job is cancelled out on the master schedule with a rubber stamp printing the date. By this means the general foreman at any time can tell at a glance just what units have been completed, when completed and by whom, and what unit each man is working on at the moment.

Stock Room Supplies Parts

It is up to the stock room to keep each subassembly department supplied with all necessary parts. The stock room has the required information on the stock-withdrawal cards previously mentioned. These cards describe each unit and list every part involved. One of these cards with "shorts"—if any—noted on the back, goes with the job. No tools or gages are brought from the stock room for assembly work. Each assembly department retains its own tools, gages, jigs and fixtures. We find this arrangement works out most efficiently because each of these assembly departments uses this same equipment over and over again.

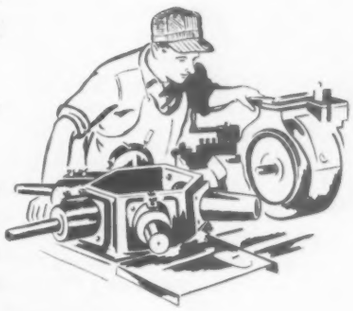
Instead of the stock room simply delivering a supply of parts to the

Fig. 4—In this room, aprons, gear boxes, compound rests and other similar units are assembled

NO TROUBLE
To machine *this* Stainless Steel

Its free-cutting qualities have made possible the use of Stainless Steel for thousands of machined parts.

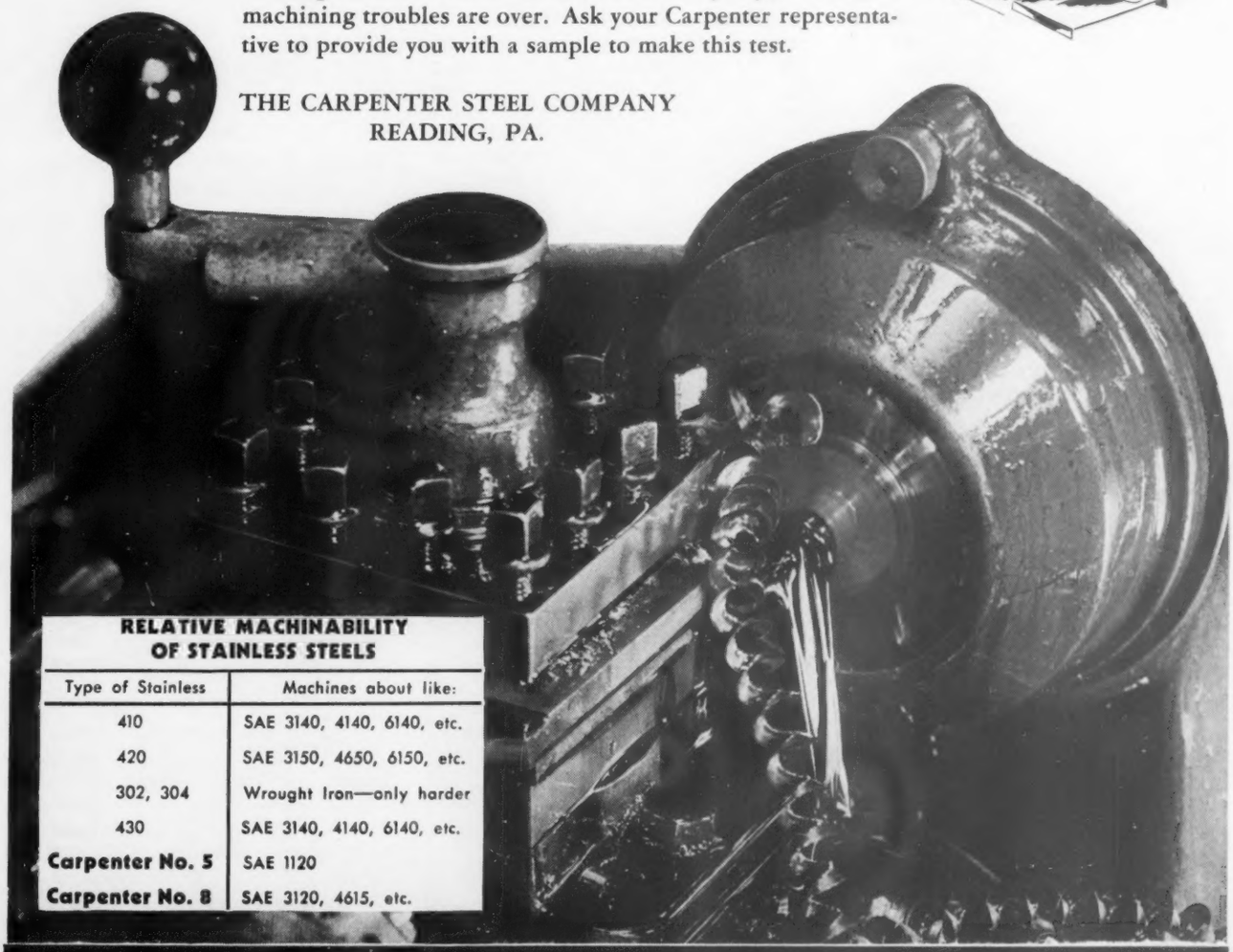
Ever since its invention by Carpenter, Free-Machining Stainless Steel has been reducing machining costs and banishing shop troubles. Jobs that just "couldn't be done," are being done every day with this free-cutting stainless.



You can cut it with regular shop tools at a speed approaching that for ordinary screw stock.

To prove it, try a piece of Carpenter No. 5 *(14% Chrome)*, or if *maximum* corrosion resistance is required, test Carpenter No. 8 *(18-8)*. The way the chips skid off the nose of the tool tells you your stainless machining troubles are over. Ask your Carpenter representative to provide you with a sample to make this test.

THE CARPENTER STEEL COMPANY
READING, PA.



RELATIVE MACHINABILITY OF STAINLESS STEELS

Type of Stainless	Machines about like:
410	SAE 3140, 4140, 6140, etc.
420	SAE 3150, 4650, 6150, etc.
302, 304	Wrought Iron—only harder
430	SAE 3140, 4140, 6140, etc.
Carpenter No. 5	SAE 1120
Carpenter No. 8	SAE 3120, 4615, etc.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

assembler and piling them on his work bench, we employ specially-designed cabinets serving both as delivery trucks and storage units. See STEEL, Dec. 25, 1939, p. 41.

Parts are removed only as needed in the course of assembly. In this way, no time is lost in transferring parts from truck to bench, and the parts are conveniently located in their definite compartments instead of being scattered around on benches or in various miscellaneous boxes and pans.

Flow of work in the subassembly departments always is in one direction. Furthermore, individual jobs are so co-ordinated that only under the most unusual conditions does a workman have to stand idle awaiting completion of a previous stage of the work.

Take the headstock assembly line as a typical example. When a tag is issued for the assembly of a headstock, work is started first on the shafts. Then a headstock casting is started down the line, where the first man breaks all sharp edges and drills and taps the holes. After various other routine operations, the casting is ready for honing of those holes which are to receive the precision spindle bearings. Two different setups are used here. Headstocks up to 18-inch are honed with a portable unit; headstocks over 18-inches are honed on a special-purpose lathe embodying driver and platen carriage.

The castings then are thoroughly cleaned and are given a coat of white sealer. Work is planned so that by this time—if not before—assembly of the shafts has been completed. These shafts are now put in, the unit then being moved along to the headstock builders who then complete its assembly. From them the unit is moved on to the end of the line for testing.

Elaborate precautions are taken while giving headstocks this thorough running-in and checking under load. This procedure is depicted by Fig. 5. At this point we make use of recirculating oil system embodying a centrifuge for cleaning the oil. While "breaking in" a new unit, it is "piped up" with the circulation oil system and as the first step, it is thoroughly flushed while idle. The inspector then starts up the headstock, running it very slowly at first, then gradually faster and faster. Lubricating oil, meanwhile, is constantly being circulated through the unit and from it through the centrifuge for centrifugal cleaning before recirculation.

When the inspector is thoroughly satisfied that the headstock is operating satisfactorily, he drains out the oil in preparation for sending the unit to the erection floor. Before he locks the screws, however, he checks thoroughly the adjustment of the spindle for runout and otherwise gives the head a final "going-over." Our policy is never to allow a unit assembly to reach the final erection floor until it has been "checked and double-checked." Any subsequent delay due to careless inspection at this stage of the game would disrupt the entire assembly schedule of the machine.

Assembly of gear boxes, tailstocks, carriages and other units is carried out in a manner similar to that of headstocks except that they are not hooked up with the recirculating oil system during their testing.

The second master schedule used by the general foreman of the assembly department—that is, the one used for controlling final erection of lathes—is quite similar in make-up and in operation to the master schedule used in connection with assembly of component units. It lists the serial number of each machine, type and size, name of the customer and promised delivery date. In addition, there are columns in which to record starting and completion of alignment of the headstock, tailstock, and carriage; building of gear box, apron, motor and guards; and testing, painting, final inspection, crating and shipping of completed machine.

When a man is assigned to do any one of these jobs, his name is written in the proper place on the schedule. When the job is completed, his name is cancelled out with a rubber stamp printing the date. By this means the status of every machine being erected in the department can be determined at a glance.

Lathe Beds Moved by Monorail

Every morning the general foreman of the assembly department receives from the general foreman of the machining department a list of all lathe beds he will receive that day. Beds are moved from one department to the other by a monorail requiring the services of one man only, despite the bulk and weight of those of large size.

Component units that go to make up the complete machine are sent by the several department foremen who have had charge of their assembly, to one end of the erection floor. There the first job is to align headstock, tailstock and carriage. Then are added various builders' parts such as lead screws, control parts and guards as well as various purchased parts such as motors, switches, collets and chucks. Supplying of purchased parts is in charge of one man who keeps a set of records entirely independent of those records covering Monarch-manufactured parts. We find this system eliminates much trouble.

Erection work is handled by three crews. The first mounts guards and motors. The second mounts gear boxes, aprons, lead screws, feed rods, etc. The third handles taper attachments, in case these units have been ordered.

When all erection work has been

(*Please turn to Page* 76)

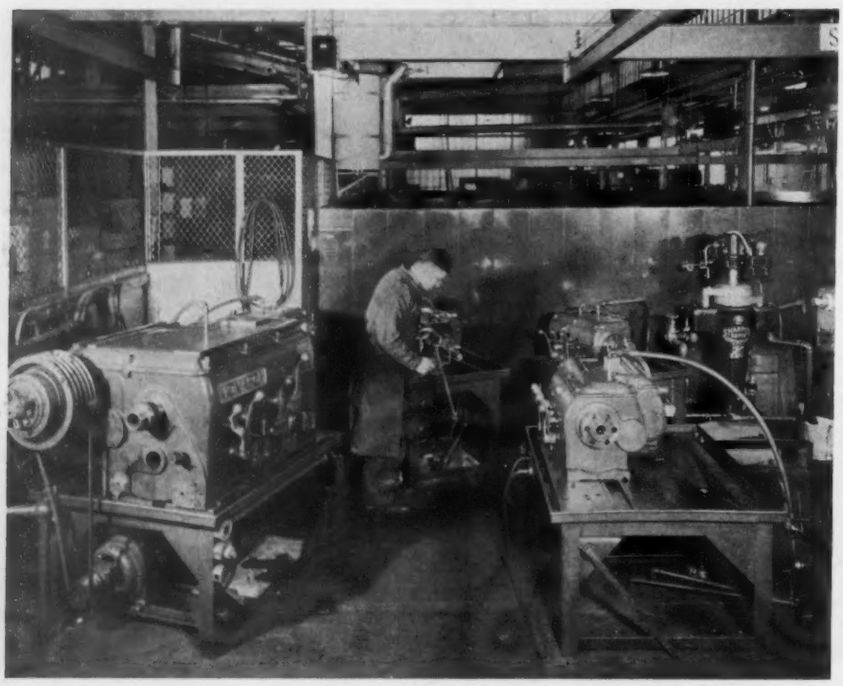


Fig. 5—Cleaning and "running in" new headstocks utilizes a special recirculating oil system with a centrifuge for cleaning the oil used

New Standards Approved By A.S.T.M. Committees

■ NUMEROUS recommendations concerning standardization and research as well as changes in specifications and new test methods were approved by the committees of the American Society for Testing Materials which met in Detroit, March 4-8, during the 1940 Committee Week. Some 110 meetings of standard committees, subcommittees and sections were conducted.

Meetings included many dealing with iron and steel, alloys, nonferrous metals, refractories and insulating materials, gaseous fuels, coal and coke, methods of testing, and metallography. Recommendations of the committees involving new standards, tentative standards, or changes or modifications in existing standards, will be subjected to letter ballot of the committees, then will be referred to the society at its forty-third annual meeting in Atlantic City, N. J., June 24-28, for final approval.

Summaries of the more important work executed by A.S.T.M. committees in the metals, refractories, fuel and testing divisions are as follows:

Committee A-1 on Steel

Subcommittees on forgings, pipe and tubing, and materials for high-temperature service had a number of important actions approved. Five proposed new tentative specifications will be referred to letter ballot, four covering carbon and alloy steel forgings, the fifth, factory-made welding fittings for pressure piping.

Many important revisions were approved in existing requirements. All of these will be detailed in the annual report of the committee to be presented at the A.S.T.M. annual meeting, Atlantic City, N. J., June 24-28.

Four forging specifications culminate intensive work by sections of Subcommittee VI on steel forgings and billets, as follows: (a) Carbon Steel Forgings for General Industrial Use; (b) Carbon Steel Forgings for Locomotives and Cars; (c) Alloy Steel Forgings for General Industrial Use; (d) Alloy Steel Forgings for Locomotives and Cars. When approved, these will replace all existing forging specifications except the two covering blooms, billets and slabs (A 17) and car and tender axles (A 21); thus removing present inconsistencies and modernizing all requirements. The sections in immediate charge included representatives from large consumers, respectively, of the so-called industrial and railroad forgings, and producers.

In each of the carbon-steel standards are some eight classes arranged by treatment (from untreated to quenched and tempered) with tensile strength ranges from 47,000 to 90,000 p.s.i. and yield points of 25,000 to 55,000 p.s.i. Elongations run from 16 to 25 per cent and reduction of area from 20 to 40 per cent, all of these varying according o size classifications up to 20 inches inclusive.

In the alloy forgings tensile strengths cover ranges from 80,000 to 125,000 p.s.i. (yields from 55,000 to 105,000 p.s.i.) with elongations from 16 to 28 per cent.

The requirements for factory-made wrought carbon and carbon-molybdenum steel welding fittings for pressure piping were prepared to be used with the A.S.A. standard for butt-welding fittings. The term "welding fittings" applies to butt welding or socket-end parts such as 45 and 90-degree elbows, caps, tees, reducers, return bends, etc. Heat-treatment requirements are provided and various physical tests. Basic materials (pipe, plate, forgings, etc.) are covered by reference to other A.S.T.M. material specifications with special chemistry in several cases, involving carbon-manganese-silicon-molybdenum ranges.

An important action included dividing the 4 to 6 per cent chromium-molybdenum casting specifications into high and low-silicon grades; another involved micrographic requirements of carbon-molybdenum pipe for high pressures and temperatures. Provisions are being set up for agreement on hydrostatic testing of pipe in excess of 2800 p.s.i.

A section under subcommittee IX recommended definite practice on hardness testing. On tubing of ⅝-inch wall thickness and over, brinell tests will be made on a section cut from the tube; modified (light load) brinell from ⅝-inch down to 0.200-inch wall; and Rockwell on smaller tubing. Brinell tests are on the outside of wall, Rockwell either inside or outside or on the end of the tube. It is hoped these recommendations eventually will come into widespread usage and tend to reduce misunderstandings.

Requirements on removal of scale from petroleum still and from alloy boiler tubes are to be clarified and also grinding of tubes to remove surface imperfections, etc. Further study is to be made of proposed tolerances for upset ends on still and boiler tubes.

The present tentative specifications for spiral welded pipe (A 211), with the addition of a marking clause, is to be voted on for adoption as standard.

To complete a recommendation made in 1939 providing chemical and certain physical limits for a new higher tensile strength boiler rivet, certain bend tests were offered. This new rivet grade to be incorporated this year in the boiler rivet specifications A 31 has maximum carbon of 0.27; manganese 0.40 to 0.80, and maximum silicon of 0.30 per cent, with a tensile range of 58,000 to 68,000 p.s.i. (present grade A is 45,000 to 55,000 p.s.i.) yield point of half the tensile strength and elongation of at least 23 per cent.

Committee A-3 on Cast Iron

Subcommittee I on pig iron approved proposed new tentative specifications for pig iron, but before they are presented to the society decision was reached to refer them for comment and criticism to numerous producers and consumers.

The group in charge of the specifications for automotive gray-iron castings (A 159-35 T) are developing changes to bring them in line with S.A.E. standards. It is expected that as revised the specifications will be recommended for adoption as formal A.S.T.M. standards.

Also to be referred for adoption are tentative specifications for light-weight and thin-sectioned gray-iron castings (A 190-36 T), and cast-iron pipe and special castings (A 44-39 T). Existing revisions in standard specifications for gray-iron castings for valves, flanges, and pipe fittings (A 126-30) also are to be referred to ballot for adoption, these latter involving inclusion of a high-test cast iron with a tensile strength of 41,000 p.s.i.; transverse strength load at center 4000 pounds minimum; and deflection in center, 0.12 inches minimum.

Committee A-5 on Corrosion of Iron and Steel

Specifications were reviewed and several extensive atmospheric and sea water tests involving iron and steel products were considered.

All sheet and pipe specimens exposed in salt water at Portsmouth, N. H., and at Key West, Fla., have been removed and tests will be discontinued. All sheet specimens have failed by fringing or by perforation. The 1940 annual report will include the final results of tests, under way for many years, such as (1) description of purpose of tests, specimens exposed, and procedure followed; (2) results of inspections; (3) conclusions the committee is able to draw. Riveted plates at these same exposure sites have not been inspected this year and continue in the test.

Black sheets exposed in the atmosphere at Annapolis, Md., for over 20 years were inspected in April and October, 1939. Ten additional failures have occurred and others are now beginning to occur in the copper-bearing sheets. Latest failures will be recorded in annual report.

Subcommittee VIII on field tests of metallic coatings has continued inspections at the 11 test sites. It is paying particular attention to unusual failures occurring from the underside of sheets exposed at Key West. Additional specimens were exposed at Sandy Hook in April and October to check an apparent difference in rate of corrosion during the six months ending at each time. Because of numerous requests, this committee will consider feasibility of initiating an exposure test program to study effects on coating weathering of larger amounts of aluminum in the galvanizing bath than the 0.01 per cent now allowed by the specifications for zinc coatings on structural steel shapes, plates and bars, and their products, A 123-33.

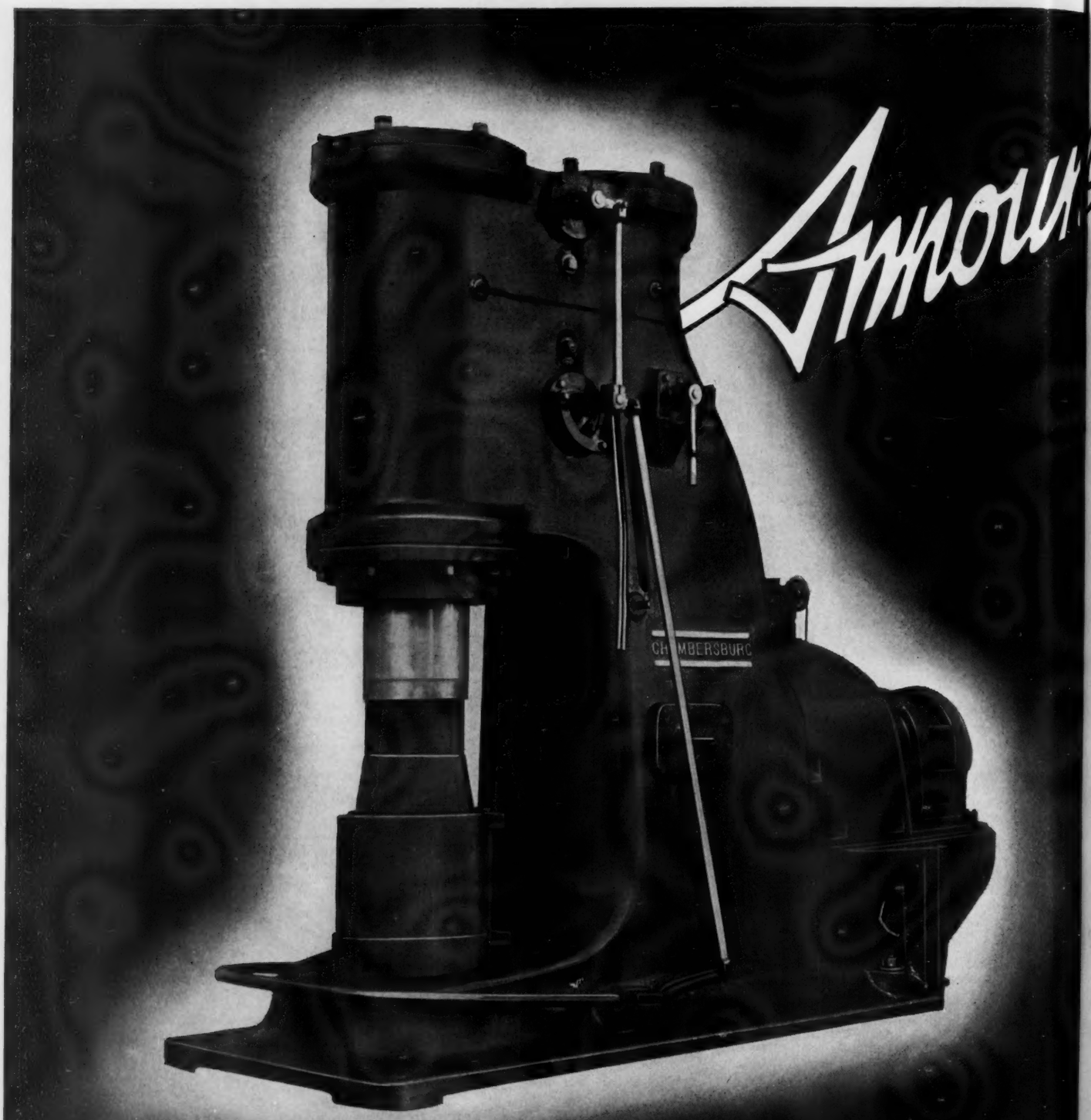
To enable a more effective study of the failures (perforation) of galvanized sheets now exposed, subcommittee VIII will look into possibility of making analyses of the coatings of duplicate specimens of sheet specimens which have been stored since exposure tests were started. For these analyses the same methods will be used as in referee tests to characterize the specimens exposed in the wire tests.

Permission has been granted the research committee of the American Electroplaters' society to use and extend some of the committee's exposure test racks at Sandy Hook in connection with a new program of this group.

As promised, subcommittee VII on test methods has studied feasibility of combining the test methods for uniformity of coatings on wire A 191, and on shapes, A 208, and enlarging the scope to include the Preece test for bolts, nuts and screws. It is expected that the combined specifications will be ready for publication in June.

The committee has approved the addition in the methods of test for local thickness of electrodeposited coatings on steel (A 219) of a curve showing the temperature factor for HCl spot test, for HCl with a specific gravity of 1.18 as the exact specific gravity of the acid has been found to be a critical factor.

Members of subcommittee VI on specifications for metallic-coated products informally discussed future development of the specifications for zinc coating (hot-dip) on hardware and fastenings (A 153-33 T) and it is hoped active work will be started before June. It is proposed to add a heavier weight of coat-



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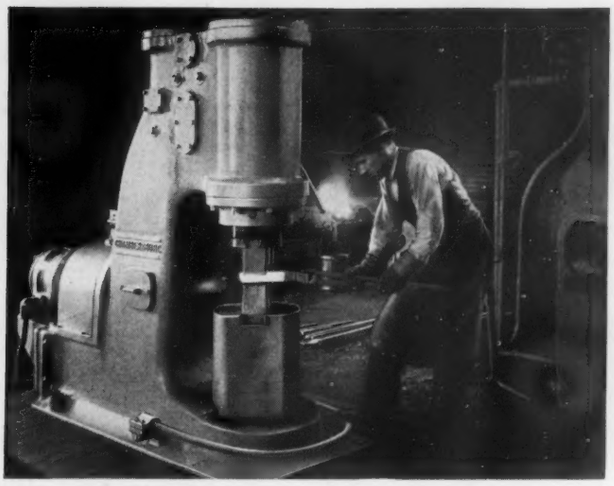

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ing class in specifications for electroplated coatings, A 164-39 T (zinc) and A 166-39 T (chromium) and an intermediate weight of coating class in specifications A 165-39 T (cadmium) as suggested by the A.E.S.-A.S.T.M. joint committee. Under consideration also is deletion of the terms "for mild service," "for general service," and "for severe service," used in these three specifications to describe the weight of coating classes and use only a class designation. This is to avoid possible confusion with the service expected from heavier weights of coatings called for in other specifications under jurisdiction of Committee A-5.

Committee A-7 on Malleable Iron Castings

Subcommittee VI on pearlitic and alloy malleable iron reported that Dr. C. H. Lorig of Battelle Memorial institute, Columbus, O., is collecting data on pearlitic malleable irons, and that these will be presented in the form of a paper at the annual meeting. When sufficient information is available the tentative specifications for pearlitic malleable-iron castings (A 220-39 T) may be revised so as to give more specific limitations.

Subcommittee on welding malleable castings, reported that information is being collected from all available sources on welding of malleable iron, and that it plans to prepare test bars which will be welded by different processes. It is expected that preliminary information resulting from this work will be available at the annual meeting.

Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys

Compiling of authoritative data on mechanical, physical, and chemical properties of a large number of alloys falling under the jurisdiction of the committee is nearing completion and will probably be published during the coming year.

One of the problems involves development of a method of corrosion testing. Survey of the available information is under way on boiling liquid tests so that a satisfactory standardized procedure can be recommended. It is possible that the committee may arrange to hold a round-table discussion on some phases of the corrosion testing of iron-chromium-nickel alloys under the jurisdiction of the committee. During the coming year the committee will continue its studies of austenitic 18 per cent chromium, 8 per cent nickel steels and attempt to correlate data concerning intergranular corrosion behavior of these alloys.

Consideration is being given to co-operating with the welding research committee of the Engineering Foundation on a code for welded structures other than welded pressure vessels.

Subcommittee in charge of specifications for castings, is planning to expand its personnel to include other interests concerned with the chromium and nickel-chromium alloy castings under its jurisdiction. This committee plans to develop any desirable or suggested revisions in the present specifications by means of a questionnaire during the coming year. (In 1939 nine casting specifications covering various compositions were consolidated into four specifications carrying the designations A 198, A 221, A 222, and A 223.)

Committee B-3 on Corrosion of Nonferrous Metals and Alloys

Three subjects of current interest were considered: (1) New series of tests involving total immersion; (2) preparation of a standardized procedure for carrying out alternate immersion corrosion tests; and (3) developing of atmospheric corrosion tests on stainless steel in contact with other metals, an extension of the galvanic and electrolytic corrosion studies previously conducted by the committees.

Total immersion tests to be carried out in five co-operating laboratories involve use of normal sodium chloride brine, normal sulphuric acid, and normal sodium hydroxide and the following metals: commercial copper (phosphorized), commercial aluminum, commercial nickel, chemical lead, commercial zinc (prime Western and high-grade), commercial tin, red brass (85 copper, 15 zinc), and brass (70 copper, 30 zinc). Tests are to be made in aerated and nonaerated solutions at 35 degrees Cent. One of the important reasons for the test is to determine the reproducibility of results from the standardized procedures which will be used.

Various interests are using alternate immersion tests to determine corrosion resistant properties of various types of nonferrous metals and alloys and need for a standardized procedure has been brought forcibly to the attention of the committee.

Valuable results came from the extensive tests of couple combinations of widely used nonferrous metals and alloys with test locations scattered throughout the country. Final results of these galvanic and electrolytic tests were issued by the committee last year and appear in the 1939 A.S.T.M. *Proceedings*. At the annual meeting two technical papers will be sponsored, one on "The Influence of Cathode Area and Circuit Resistance in Galvanic Corrosion," by W. A. Wesley; and "Some Observations of the Potentials of Metals and Alloys in Sea Water," by F. L. LaQue and G. L. Cox, all associated with the International Nickel Co. Inc.

Committee B-7 on Light Metals and Alloys, Cast and Wrought

One of the important actions was approval, subject to committee letter ballot, of two new test methods for anodic coatings on aluminum, one covering a procedure for determining scaling of the coating and the other for determining weight of the oxide coating. These will be recommended for publication.

A group of four papers, comprising a Symposium on Anodic Coatings, has also been arranged for the annual meeting as follows: "Anodic Coatings as Seen through the Microscope," by Fred Keller, Aluminum Co. of America; "Thickness of Anodic Coatings on Aluminum," by J. D. Edwards, Aluminum Co. of America; "Abrasion Resistance of Anodic Coatings on Aluminum," by H. G. Arlt, Bell Telephone Laboratories Inc.; and "Electrical Breakdown of Anodic Coatings on Aluminum," by K. G. Compton, Bell Telephone Laboratories Inc.

Another important action was addition to tentative specifications for magnesium-base alloy bars, rods, and shapes (B 107) of three new wrought alloys with controlled or high-purity base metals which offer considerably greater corrosion stability than the present alloys. The committee also decided to delete from tentative specifications for magnesium-base alloy ingot for remelting all requirements for wrought alloys since these are not marketed in ingot form.

The several subcommittees responsible for existing specifications covering aluminum and aluminum alloy ingots, castings, and wrought metals are planning to review them during the year, particularly with respect to provisions for testing these alloys. Consideration also will be given to feasibility of consolidating several existing specifications for aluminum alloy sheet and plate. A sub-group has been appointed to investigate the effect of impurities on aluminum alloys.

Subcommittee responsible for the magnesium-base alloys is planning to give consideration to protective coatings for magnesium alloys castings, forgings, sheets, and other wrought products.

A special committee will be appointed to study the classification and designation of aluminum alloys, following which there may be a similar study of the magnesium-base alloys. Consideration is being given to the salt spray test procedure (B 117), also methods for determining reflectivity, scratch resistance, and abrasion resistance.

Committee C-8 on Refractories

Specifications for ground fire clay (C 105) are to be revised to provide that on the commercial grade, 95 instead of 90 per cent, shall pass through a 20-mesh sieve; requirements for superduty ground fire clay will be added. Changes in specifications C 49-24 covering lime for silica brick manufacture were proposed for submission to committee C-7 on lime.

Specifications for fireclay brick for stationary boiler service (C 64-39) are to be withdrawn and replaced by two new standards, one covering materials for severe duty service, the other for moderate duty service. Also the committee plans to recommend withdrawal of specifications for refractories for construction of incinerators (C 106-39) and for fireclay brick for malleable furnaces with removable bungs and for annealing ovens (C 64-39), and replace them with new specifications which will include a hot-load test as a means of determining refractoriness. This hot-load test also is to be included in the new specifications covering fireclay brick for severe duty and moderate duty boiler service.

During the past year classifications of refractories have been developed and new proposals will cover low-heat duty, intermediate heat duty and high-heat duty fire clay and also classification requirements for insulating fire brick.

New definitions of abrasion, corrosion, erosion and slagging will be presented at the annual meeting. Three existing tentative items are to be adopted as standard: Method of panel test for resistance to thermal and structural spalling of high heat duty fireclay brick (C 107-36); method of shear testing of natural building stone (C 102-36); and tentative method of test for true specific gravity of burned refractory materials (C 135-38 T).

Standard methods of chemical analysis of refractory materials (C 18-39) cover analytical procedures for a number of refractories including chrome ores and chrome brick. The latter are to be revised and brought up to date.

New tentative methods for determining warpage of fire brick and tile have been devised. Work was started on an industrial survey of refractories in the zinc industry. This will be the ninth in the series that the committee has issued.

The committee also considered publication of its *Manual on Refractory Materials*, which will include in addition to all of the A.S.T.M. specifications and tests on refractories the industrial surveys, and plans to recommend to the society that this be issued in the fall after the autumn meeting of committee C-8.

Committee C-16 on Thermal Insulating Materials

Consideration was given to methods for determining the physical properties of preformed insulation and to tests for thermal properties, except thermal conductivity, of all forms of insulation.

Considerable progress has been made in the preparation of standard physical test methods for various types of insulating materials. Tests under development cover procedures for determining compressive strength, flexural strength, impact resistance, etc. It is expected that within the coming year these methods will be ready for final approval.

Subcommittee on thermal conductivity, which functions as a joint committee of the American Society of Heating

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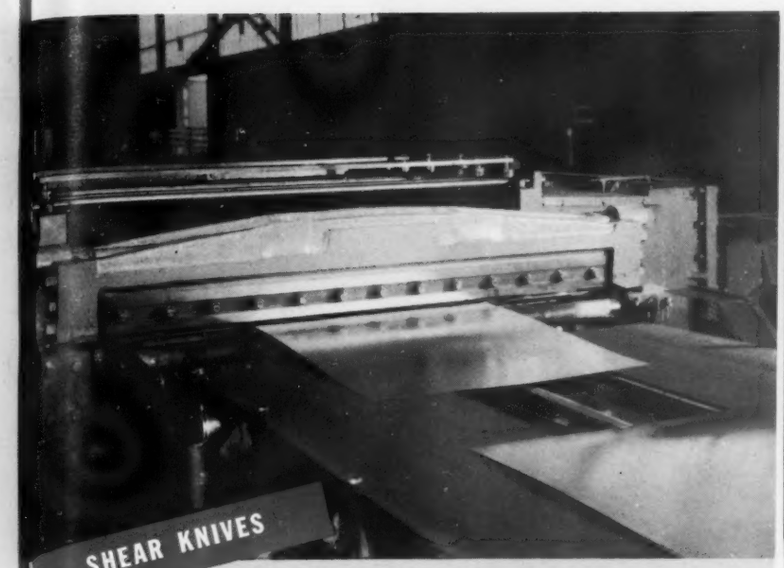

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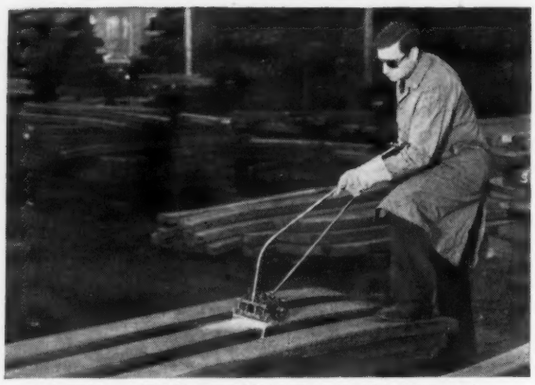

Flame-descaling billets with flat-tip assembly mounted on carriage.

THE PROCESS IS ECONOMICAL

It may be conducted by ordinary labor in areas adjacent to other plant operations or machinery. There are no handling or rehandling costs. Defects, seams and fissures that may later cause difficulty and perhaps failure are exposed. A natural surface, free from discoloration, is secured.

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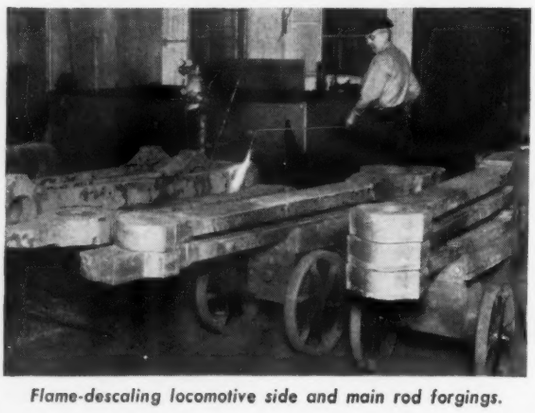

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and Ventilating Engineers, American Society of Refrigerating Engineers, National Research council, and A.S.T.M., also held a meeting at which its program was considered. This joint committee is studying three different types of conductivity test, the guarded hot-plate method, the guarded hot-box method, and the guarded-end cylinder method for testing cylindrical pipe coverings. Test procedure by the guarded hot-plate method is practically completed.

Committee D-5 on Coal and Coke

Tentative revisions of the standard method of sampling coal for analysis (D 21-16) are to be advanced to standard status. These revisions provide for methods of reduction of gross samples of coal by mechanical means which are considerably more accurate than hand methods of reduction because of elimination of personal errors. Acceptance of this revision as standard will necessitate some changes in the standard methods of laboratory sampling and analysis of coal and coke (D 271-37); consequently present tentative revisions of these methods are to be recommended for advancement to standard.

Committee agreed on a number of revisions of the present tentative method of sampling coals classed according to ash content (D 492-38 T). It is believed these revisions constitute a considerable improvement in obtaining a more representative sample for analysis. The method as revised is to be continued as a tentative standard.

Present tentative definitions of the term coke (D 121-26 T) will be recommended for adoption as standard in a revised form.

Effect of Speed of Testing

In connection with the revision of the standard methods of tension testing of metallic materials (E 8-36) recommendations have been made regarding the basic requirements for speed specifications. A statement from this standard follows:

"(a) The speed at which a specimen is strained may have a marked effect on the values found for the tensile properties. Therefore, in specifications requiring definite values for the tensile properties, permissible limits for the speed of testing should be specified. By speed of testing is meant the rate of separation of the two ends of a measured gage length of uniform cross section. This is a true measure of rate of increase of strain when expressed as the change per unit of gage length and per unit of time. Convenient units are inches per inch per minute or per cent per minute. In the range in which stress is proportional to strain, the rate of application of stress is proportional to the rate of strain. This permits the more convenient measure of rate of change of stress in pounds per square inch per minute which is proportional to the rate of strain in inches per inch per minute. It is recognized that rate of strain is not easily measured in commercial testing. If, however, speed of testing has an important influence upon tensile properties of a given material, it is the rate of strain which must be held within prescribed limits.

"(b) The permissible range of speed should be chosen so that the variation in tensile properties produced by this range of speed with exactly similar specimens from one lot of material will be of the same order as the probable variation between specimens from different lots of reputedly similar material.

"(c) The change in tensile strength values produced by a change in the rate of straining is usually considerably less than that observed for the yield strength. The range of permissible speeds is, therefore, wider."

This section has been sponsoring an investigation of the effects of speed on the results obtained in tension tests of metallic materials. In this investigation, tests have been made on several materials, including steels, copper, brass, aluminum, magnesium and monel metal. Special equipment has been used in order to eliminate variables attributable to the characteristics of the machines used, the testing technique, and the personal equation. This method of attack has produced results of considerable fundamental importance which have been confirmed by other tests in various commercial laboratories without the use of special equipment. The resulting data are expected to be reported in June.

Methods of Testing

A steadily growing interest in the general subject of presentation and interpretation of data and the advantages of using so-called statistical methods of analysis is apparent. Work in this field is in the charge of technical committee IX of A.S.T.M. committee E-1 on methods of testing. A number of additions and improvements in the Manual on *Presentation of Data* will include control charts for coefficient of variation and a new supplement covering relation between the number of tests and sampling errors of averages. A new printing of the manual is contemplated this year.

Another section of committee E-1 is concerned with the designation and interpretation of numerical requirements and there has been under consideration proposed recommended practices. The recommendations are intended to assist various standing committees in the use of uniform terms and conventions in expressing the numerical requirements in specifications and methods of testing. Their aim is to outline practices which should aid in clarifying the intended meaning of limiting and tolerance values, with which test values are compared in acceptance and rejection of material. Certain non-numerical terms closely related to numerical expressions are also included.

The practices give interpretations to the following: (1) The phrase "to the nearest. . . . . ", when applied to a specified limit; (2) The underlining of figures in a specied limit, for example, "1.500"; (3) The symbol "±", when applied to a specied value of maximum permissible deviation; and (4) The term "average." This proposed tentative recommended practice will be submitted at the annual meeting.

Because of the widespread use and importance of the tension test in evaluating strength of certain materials, the methods of tension testing of metallic materials (E 8-36) are significant. A number of changes were approved including more satisfactory requirements concerning test specimens and related matters pertaining to the testing of piping and tubular products. Another change involves the statement concerning the importance of speed of testing.

Committee E-4 on Metallography

No action was taken on matters relating to standards or recommended practices under development. The steel committee had in mind referring to the new tentative method of preparation of metallographic specimens (E 3-39 T) in connection with the macro-etching test in certain of the specifications for steels for use in high-temperature service, but before making definite reference the opinion of committee E-4 on the macro-etching methods is desired.

The present grain size standard for steel (E 19) covers only the austenitic grain size and a standard for ferritic grain size is needed. The matter was referred to subcommittee VIII on grain size for action. Problems in measuring nonmetallic inclusions in steel were discussed and the need for a standard method of measuring and reporting these inclusions was expressed. The establishment of a new subcommittee to study the subject was authorized.

Preparation of metallographic specimens by electrolytic polishing and lapping methods was considered and it was decided to promote a round-table discussion of these methods during the annual meeting.

Applied Psychology for Foremen, Supervisors

■ *New Techniques for Supervisors and Foremen*, by Albert Walton; cloth, 233 pages, 6 x 9 inches; published by McGraw-Hill Book Co., New York; supplied by STEEL, Cleveland, for $2.50.

Applying the practical facts of psychology learned in a variety of contacts with workers the author gives an explanation of human behavior and methods for applying these facts to control of workers for the best interest of the employer and employe.

The book contains no technical academic terms and no startling theories are propounded. Its statements are based on what the writer has gathered from researches of men maintaining the same scientific attitude as is held by the physicist or the chemist. It is a laymen's document.

Subjects treated include habits, attitudes and abilities, tests of intelligence, personality, resistance to change, psychology and scientific management, facts about learning, normal and abnormal, fatigue, monotony and accidents, and morale.

An appendix contains discussions arising in a postgraduate class, involving actual situations arising in the experience of supervisors.

Approves Revision of Tube Radiator Practice

■ Recently proposed simplified practice recommendation for large tube cast iron radiators has been accepted by the industry, and approved for promulgation as of March 1, 1940, according to division of simplified practice, bureau of standards, Washington.

Recommendation will be identified as simplified practice recommendation R174-40, and lists 17 sizes of large tube radiator sections, ranging from 4 to 7 tubes, inclusive, and in varying heights. According to the Institute of Boiler and Radiator Manufacturers, sponsors of the recommendation, the reduction from 33 sizes formerly made to the 17 recommended sizes will constitute a sound basis for the concentration of production on a minimum number of sizes. It should also reduce the cost of production by eliminating many varieties that have been slow to turn over, and will facilitate maintenance of adequate inventories of recommended sizes.

Waste-Heat Boilers

Waste-heat boilers in exhaust of heavy duty blower-gas engines show overall efficiencies up to 70 per cent. Simple gas-engine waste-heat-boiler combination has extremely high overall recovery

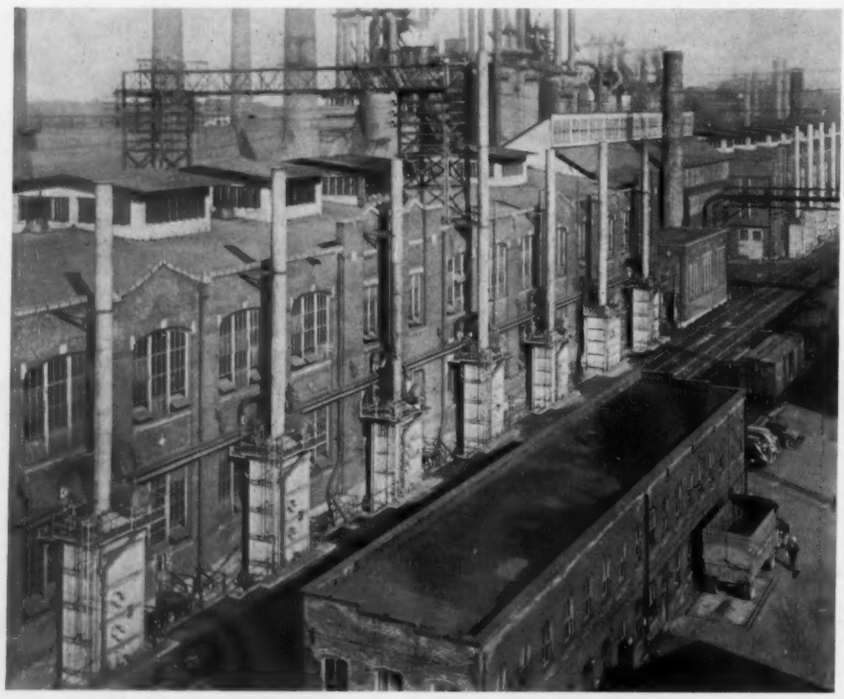
By T. A. LEWIS
Combustion Engineer
Bethlehem Steel Co.
Bethlehem, Pa.

■ PROGRESS in power production has been rapid in recent years and is still under way. As a large consumer of power, the steel industry has not been backward in capitalizing on this development, more especially as related to improvements that have been effected in steam-turbine plants. It is expected that special opportunities for increasing efficiency of power production that are inherent to the making of steel also will be more fully capitalized on than at present.

This development doubtless will take the form of utilization of waste energy and heat. Recent applications of waste-heat boilers to conserve the sensible heat from the exhaust of heavy duty blower-gas engines at the Bethlehem plant are evidence of the trend toward heat conservation in typical steelmaking practice.

As long ago as 1918, experimentation was under way at Bethlehem for utilization of sensible heat in gases from exhaust of heavy duty gas engines, long employed as prime movers in the steel industry. The first waste-heat boiler designed to accomplish this purpose was installed and put into use here in 1934. This layout, modified only in minor details in later installation, was the first of its kind in the country to use waste-heat boilers equipped with economizers and superheaters to recover waste heat from the exhaust of large gas engines and to utilize it efficiently in generating additional steam.

With the success of the first unit, in practically continuous operation since 1935, seven similar complete units were installed during the next three years. These earlier installations and three additional installations just completed make a total of eleven units shortly to be in operation with all primary gas engine units at the Bethlehem plant so equipped. Smaller secondary units maintained for standby service will not be equipped with waste-heat boilers.



Total of 11 waste-heat boilers, or one for each primary gas-engine unit at Bethlehem, are shown here

Steam Still Required

Due to the low calorific value of blast furnace gas, steel plants have been slow to use it for other than stove and boiler fuel. Nevertheless, a 500-ton furnace will supply about 2,000,000 cubic feet of gas per hour above its own requirements and the tendency now is to use this gas in engines and in metallurgical furnaces to replace higher priced purchased fuel.

Furthermore, in spite of the trend toward electrification, normal steel plant operation still requires a large supply of steam. At Bethlehem, it was estimated that over 6 per cent of the total purchased fuel could be recovered as waste heat and redistributed. Experience has indicated that waste-heat boilers applied to primary gas engines are capable of recovering more than two-thirds of this possible saving in the form of steam for process work and power generation. This performance

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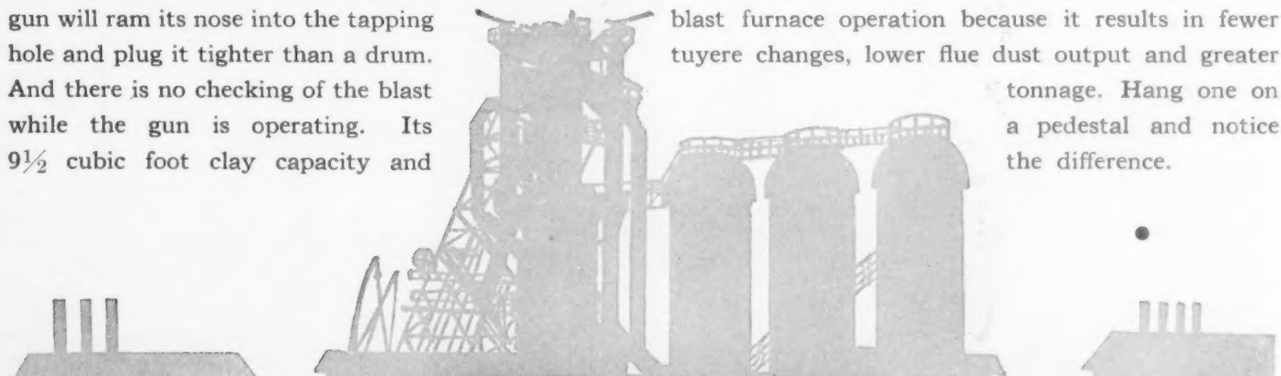

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considerably exceeds original estimates.

Early efforts to recover waste heat in Europe and in this country involved the use of fire-tube boilers and economizers. At Bethlehem this same arrangement was at first considered. However, limitations of space recommended a more compact unit. Moreover, for efficient waste heat recovery, a final flue-gas temperature of 350 degrees Fahr. and a feed-water temperature of 200 degrees Fahr. were desired. This low differential, together with the fact that engine exhaust gases are relatively clean, precluded consideration of the fire tube economizer.

A waste-heat boiler of the modern, water-tube type also was favored because it can be applied to gas engine exhausts very simply without any auxiliary equipment such as fans. No infiltration of air can take place since the boiler setting is under pressure. External cleaning of tubes is simplified by pulsations of the exhaust gas from the engine and the flow of relatively clean gases.

Amount of steam which can be generated in a waste-heat boiler, when supplied with definite quantity of gas at a given temperature, depends on the size of boiler and allowable draft loss. In practice, thoeoretical limit of recovery is the heat in the gases between the temperature at which they leave the engine and the temperature of the feed water entering the economizer. It is not practical to build a boiler that even closely approaches this condition, yet these installations indicate that it is economically possible to design a boiler with an efficiency up to 70 per cent, if it is permissible to build up a draft loss of about 4 inches of water, or higher, through the boiler. This degree of efficiency has been achieved in practice as shown in Table I. Here also is shown the heat balance for entire engine and boiler combination.

TABLE I—Heat Balance of 4000-Kilowatt Gas Engine and Boiler

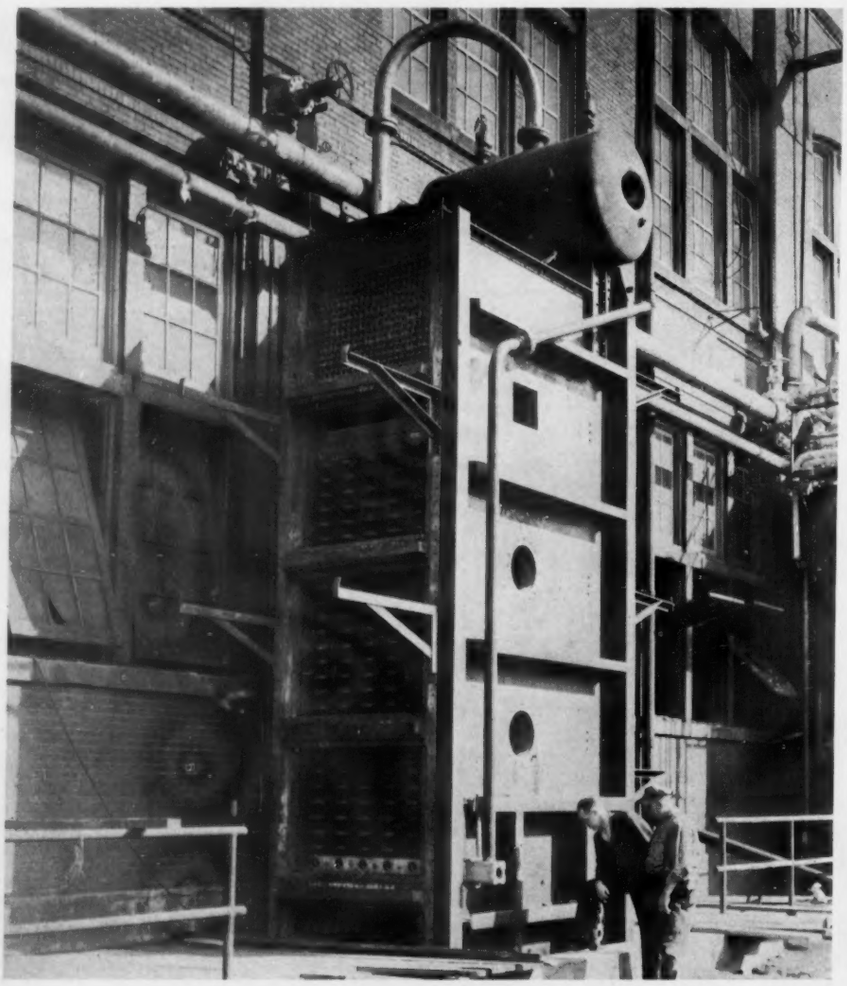
	Millions B.t.u.	Per cent
1—Net power generation	12,683	27.16
2—Steam generation	13,983	29.94
3—Loss to cooling water	12,040	25.78
4—Loss to boiler blowdown	913	1.95
5—Loss to sensible heat in stack gas	4,691	10.04
6—Loss to CO in stack gas	.....	0.00
7—Radiation and unaccounted for	2,398	5.13
	46,708	100.00
Heat Balance of Boiler		
1—Steam generation	13,983	70.51
2—Loss to blowdown	913	4.60
3—Loss to sensible heat in stack gas	4,691	23.66
4—Radiation and unaccounted for	243	1.23
	19,830	100.00
Engine Heat Balance		
1—Net power generation	12,683	47.18
2—Loss to cooling water	12,040	44.80
3—Radiation, mechanical and electrical losses	2,155	8.02
	26,878	100.00

Study Made of Various Boilers

As a final check on the probable efficiency of the original waste-heat boiler installation, a comprehensive study was made of various types of waste-heat boilers, based on an evaporation of 12,000 pounds of steam per hour. The outstanding conclusion was the advantage of extended surface construction, demonstrated by the ratio between dry side and wet side area, in combination with small tube length, moderate overall dimensions, and providing high evaporation with only a single pass.

The boiler design adopted has an extended surface and 4-inch draft loss. Flue gases enter the boilers at 1200 degrees Fahr. and leave at 350 degrees Fahr. Feedwater enters the economizer at 200 degrees Fahr. Steam is generated at 165 to 200 pounds pressure and 200 degrees of superheat. As shown in the accompanying illustration, the unit consists of three extended-surface boiler sections, a similar economizer section and one row of

(*Please turn to Page* 79)



Closeup view of waste-heat boiler during construction. Return bends in economizer and placing of doors can be seen here

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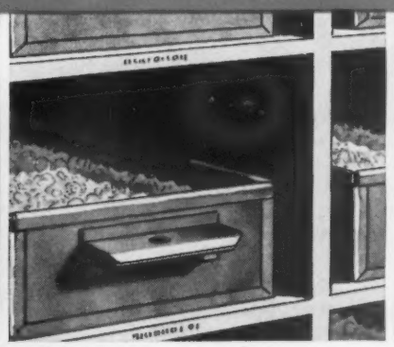
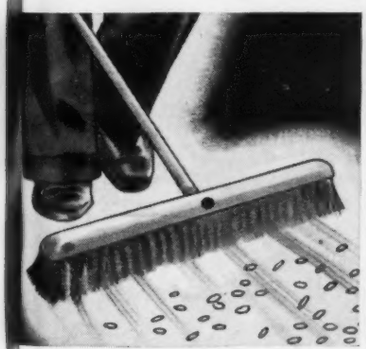


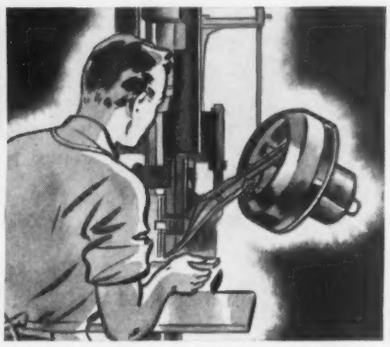
2—Inventories automatically balanced —stock control simplified

3—No time wasted putting lock washer on screw

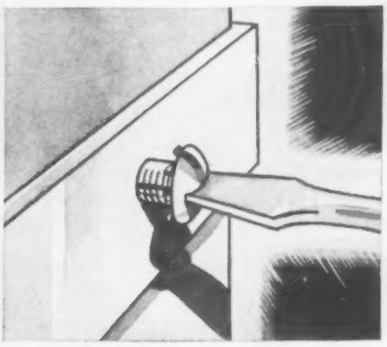
4—Perfect for fastening hard-to-reach parts



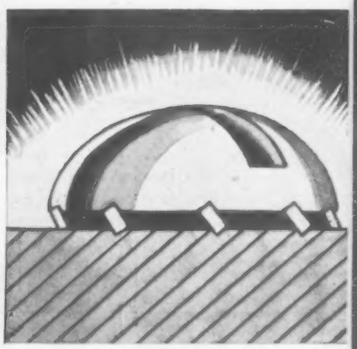
5—Prevents lost lock washers —an important saving



6—Can be used in automatic hopper feed drivers



7—No screw can be assembled without a lock washer



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Enameling Irons

Study of microstructure reveals coarse graphite and nonmetallic inclusions as cause of blisters. Chemical composition important only as it affects metal structure. Other troubles also traceable

By A. S. HAWTIN
Crane Ltd.
Ipswich, England

■ PHYSICAL condition and chemical composition of cast iron for porcelain enameling are two extremely important factors. Possibly correct microstructure is the most essential single item as the causes of all enameling trouble directly traceable to the metal can be revealed by a careful metallographic examination of the iron in the immediate neighborhood of such defects.

Microstructure of a good enameling iron in the "as-cast" condition should consist of finely divided graphite evenly distributed in a background of pearlite and ferrite surrounded by a network of phosphide eutectic. All the sulphur should be present as manganese sulphide. A typical example of such a structure is shown in Fig. 1.

After annealing, the pearlite breaks down into ferrite plus graphite and the combined carbon content therefore is lowered to about 0.05 per cent. A micrograph of this same iron after annealing is shown in Fig. 2. It is essential that enameling irons be free from nonmetallic inclusions and porosity.

Graphite size and distribution is of utmost importance. Coarse graphite will invariably give rise to blistering. Figs. 3 and 4 show graphite formation of two castings of identical design made under what were normal production conditions of two different foundries. Castings with a structure similar to Fig. 3 give good results in enameling, whereas it is virtually impossible to enamel any casting with a graphite size and distribution as in Fig. 4.

Coarse graphite such as in Fig. 4 is formed as a result of excessively high pouring temperature which, apart from giving an undesirable distribution of constituents, causes unnecessary burning up of the sand and gives rough casting surfaces. Best pouring temperature for any

Fig. 1—This material enameled well. In "as cast" condition etched, 200 diameters magnification

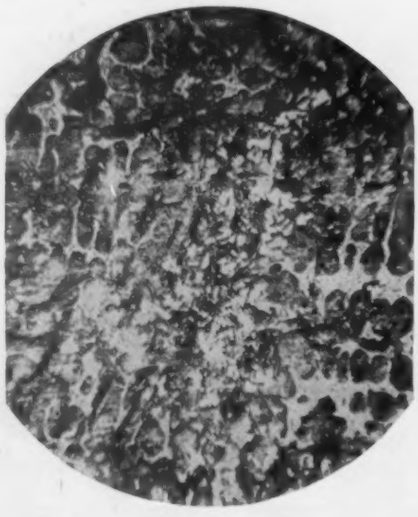


Fig. 2—Same as Fig. 1 but after annealing. Also etched, 200 diameters. Photos courtesy Ferro Enamel Corp., 4150 East Fifty-sixth street, Cleveland

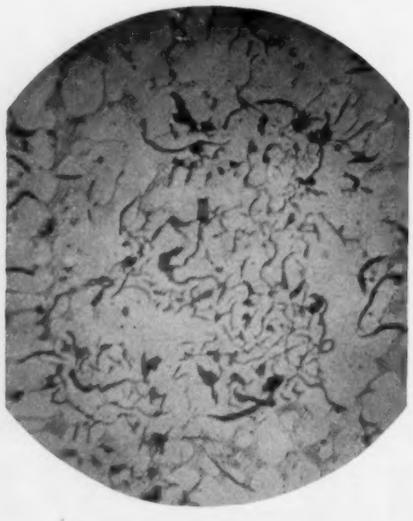


Fig. 3—Graphite of satisfactory fineness as evidenced by good enameling properties. Unetched, 200 diameters

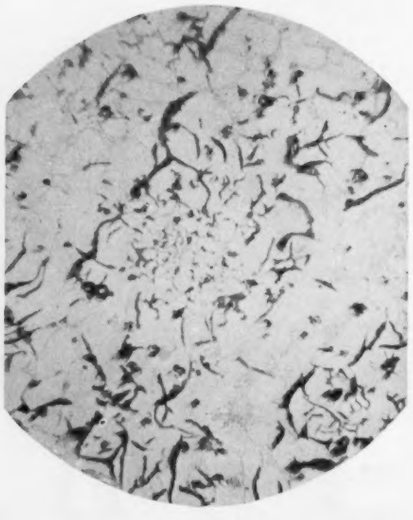


Fig. 4—Coarse graphite distribution. Casting blistered on enameling. magnified 200 diameters

casting is naturally a function of the inherent fluidity of the metal and the design of casting. However, it should not be in excess of that required to run the casting clean and without fear of cold shuts.

Trouble often is experienced from enamel blistering over heavy lugs. The cause of this generally can be traced to coarse graphite, porosity or a combination of both. Slower cooling of the section after casting results in increased graphite size and a tendency toward porosity. This can be prevented by inserting local cast iron chills in the mold. These increase the cooling rate sufficiently to insure a dense structure and thus to eliminate the possibility of blistering. Results of such local chilling are illustrated in Figs. 5 and 6.

Some interesting experiments were made in which a number of open-grained castings were maintained at about 800 degrees Cent. for 15 minutes and then quenched in water from that temperature. This had the effect of rendering the structure more dense and thus considerably improving the enameling properties. Such methods could not, of course, be applied generally but are mentioned as of interest.

It is essential that enameling iron be completely free from nonmetallic inclusions. Fig. 7 shows inclusions which caused blistering. These inclusions were close to the surface of the metal. Fig. 8 was taken at the same position in a casting of

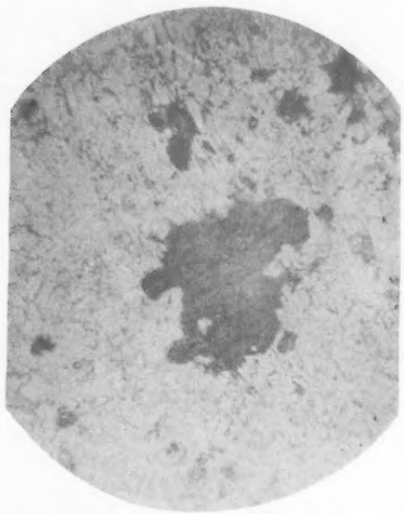


Fig. 5—Nonmetallic inclusions near surface. Casting blistered. Magnified at 100 diameters

the same design which enameled well. It is included for comparison. Note the absence of inclusions.

In avoiding such inclusions, it is important to maintain a good well of hot metal in the cupola, keep molds free from loose particles of sand, and particularly to employ gates of correct design. A high limestone content in the cupola charge, sufficient to give an extremely fluid slag, is generally recommended but work which the writer has carried out in this connection indicates that the degree of fluidity of the slag should be controlled carefully.

With a high limestone charge, metal in the ladles is generally covered with a continually breaking film of quite fluid slag. Although the importance of skimming often is emphasized, it is virtually impossible to remove this film by skimming. Also the oxide layer which forms around the ladle sides breaks up when the metal is poured into the ladle, rises to the metal surface and passes into the mold with this extremely fluid slag.

During sand-blasting, this nonmetallic material is removed to a large extent, leaving slag holes in the casting. By reducing limestone content in cupola charge, however, this continually breaking film of uncontrollable slag is replaced by a steady viscous layer which remains on top of the metal and holds back any oxide particles which rise from the sides of the ladles. Under these circumstances, skimming becomes of secondary importance and often is unnecessary because the layer falls toward the back of the ladle and becomes a slag retainer by using a little care in pouring.

It is not possible to give a definite figure for the quantity of limestone per charge because this is directly proportional to the amount of slag-forming material introduced on the pig iron and scrap. However, it should be sufficient to produce a slag which is fluid enough to give the necessary cleansing action in the cupola and sufficiently

(*Please turn to Page* 76)

Fig. 6—Edge of sound castings, magnified 100 diameters

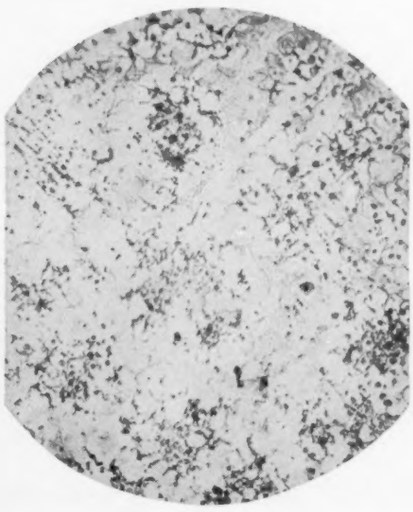


Fig. 7—Unsound areas in door lug, 50 diameters. Boiled on enameling

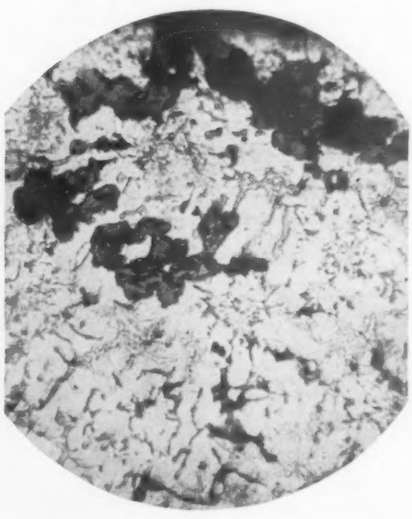


Fig. 8—Section of chilled door lug. Note soundness and graphite distribution. Enameled well. At 200 diameters

Hi-Tensile Steel Ships

Submarines of welded high-tensile steel made by Dutch shipbuilders have 30 per cent greater diving depths, other advantages. Methods of construction and procedure differ little from those in this country

PART II

By IR. G. deROOY
Chief of Construction
Dept. of Submarines
Royal Dutch Navy
and
Dr. P. SCHOENMAKER
Chief Metallurgist
SMIT-Transformer Works
Twaalf Apostelenweg 25
Nijmegen, Holland

■ THAT the regular surface contour of an unfinished weld exercises great influence on the fatigue resistance of the weld due to notch effect was pointed out in part I.

This influence is found much greater with fillet joints than with straight butt joints, the type of joint in the previously mentioned investigation. Greater sensitivity of the fillet weld to notch effect possibly is due to the considerable changes in cross section and partly because of the open cleft between the two plates. To find the most favorable shape with the greatest resistance to varying stresses, a number of comparative tests were made with T-joints using a special machine which produced stresses varying between two tension values chosen in such a way that the dynamic tension came to 30 per cent of the static stress. The highest value of the static tension where no fracture occurred was determined. Some 2,000,000 stress variations were made with each test bar.

Three forms of T-joints, Fig. 1, were examined. These included a 2-sided fillet weld, the X-weld and the K-weld. Tests were made with both high-tensile steels A and B (see part I for analyses) and also with mild steel.

Results are as follows: With the 2-sided fillet weld, high-tensile steel A withstood combined stresses of 14,200 pounds per square inch plus or minus 30 per cent for 2,000,000 repetitions of stress. High-tensile steel B gave a value of 12,800 pounds per square inch, whereas mild steel gave a value of 17,700 pounds per square inch, higher than either A or B.

With the X-joint, high-tensile steel A gave a value of 28,400 pounds per square inch against 24,100 pounds per square inch for high-tensile B and 27,000 pounds per square inch for mild steel. In this instance, mild steel was not quite as resistant as the best of the two high-tensile steels.

K-Joint Also Recommended

These results clearly show that the X-joint merits preference above the 2-sided fillet weld. Where the X-joint is not possible, the K-joint is to be recommended. While strength of K-joint is not as great as that of the X-joint, it is still considerably greater than that of the fillet weld. Examinations of fractures of X-welds and fillet welds show the notch effects at the roots of the fillet as the obvious cause of early fatigue failure. In X-joints, fatigue fracture usually is introduced from an outside point.

Comparing results of high-tensile and mild steels, there is little difference in their strength. Mild steel appears even more suitable for fillet welds.

This, no doubt, is the result of the high notch sensitiveness of high-tensile steels previously noted. This proves once more the extreme importance of paying careful attention to obtaining smooth contour and finish of welds in high-tensile

From paper in contest sponsored by James F. Lincoln Arc Welding Foundation, Box 5728, Cleveland.

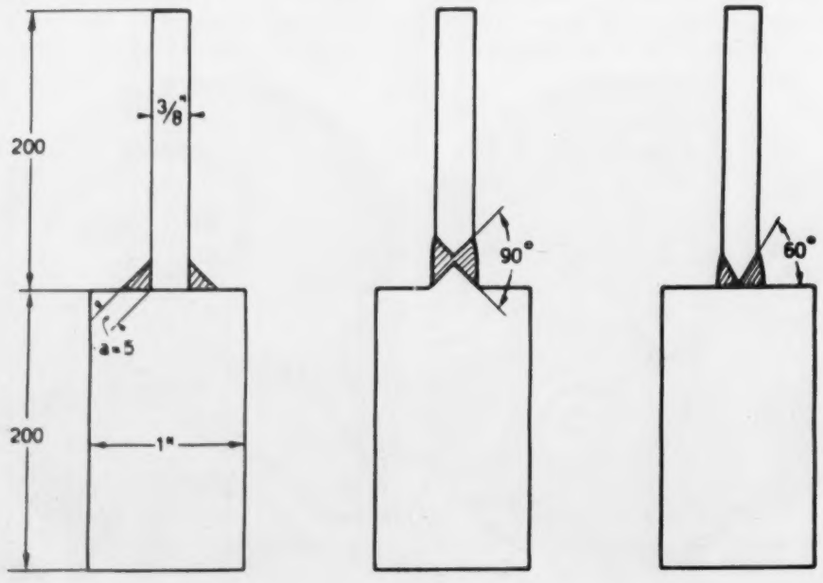


Fig. 1—Types of T-joints: from left to right, 2-sided fillet, X-weld and K-weld

FIVE *Bull's eyes* IN OUR LINE OF ALLOY AND SPECIAL TOOL STEELS Cast-to-Shape

KROKOLOY— Chrome cobalt alloy castings for super-high production. Air-hardening.

MARTIN STEEL— High carbon, high chrome, alloy castings for medium high production. Air-hardening.

CASTALOY— A low-priced, high carbon, high chrome alloy. Air-hardening.

CARBOMANG — Oil-hardening. A high-grade, electric furnace, laboratory-controlled steel.

These steels cast-to-shape with minimum machining allowance or file finish.

FLAMALOY, a thoroughly practical, low-cost, flame-hardening steel is the latest addition to our line of cast-to-shape steels. For punches, pads and inserts in large pressed metal dies—applications where lesser alloyed steels with good physical properties and wear-resistant qualities are needed—our Flamaloy castings are unusually desirable and are extensively used.

Hardening is easy with Flamaloy. Most of our customers merely heat with a torch those surfaces to be hardened, and follow with a water-quench—all in one simple, convenient operation, for a high Brinell reading. Machining and spotting-in are done while the steel is still in the annealed state.

Flamaloy castings weld readily, and draw beads or joint lines can be built up by this method.

* * *

In addition to our regular line of steels, we are also glad to quote on any special alloy steel castings you may require, and on the line of regular, alloyed and electric furnace gray irons, cast-to-shape, of our associate, Detroit Gray Iron Foundry Company.

DETROIT ALLOY STEEL COMPANY

Foot of Iron Street — Detroit, Michigan

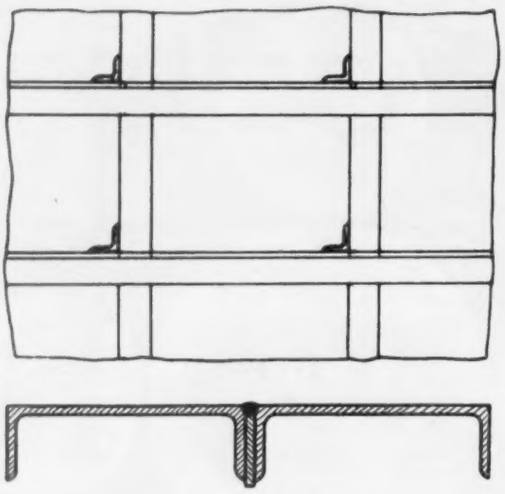


Fig. 2. (Upper)—Trussweld system. Fig. 3. (Lower)—Channel system

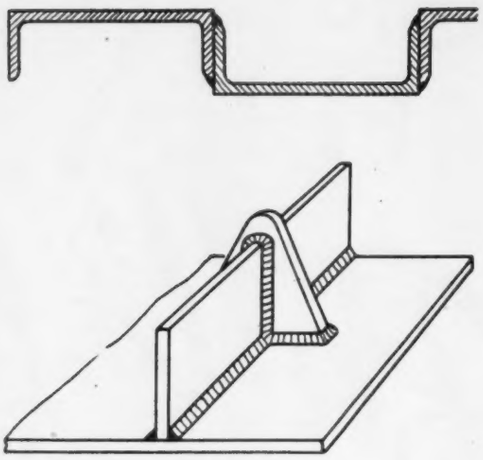


Fig. 4. (Upper)—Reverse channel system. Fig. 5. (Lower)—Lock notch system

steel which must withstand fatigue stresses.

To attain greatest possible strength and to avoid difficulties, use of welded high-tensile steel in ship construction has given rise to a number of construction methods of particular interest.

Fig. 2 illustrates the trussweld system. Rigidity is obtained by welding L-channels in three perpendicular dimensions at junction points. This method is used principally on tank-lighters, pontoons, barges and ferries.

Ship Resistance Greater

Fig. 3 diagrams the channel system. In this method the hull consists of connected U-scantlings.

In Fig. 4, illustrating the reverse channel system, the hull also is built up of U-scantlings but always turn and turn about. In this manner a larger amount of resistance is obtained with the same weight. On the other hand, the ship resistance also is greater and a larger quantity of welding material is therefore necessary.

Fig. 5 shows the lock-notch system. In this method, longitudinal frames are used over which knee-shaped cross connections are firmly welded.

Fig. 6 illustrates transverse frame system with longitudinal plating. Here the hull construction is practically the same as normal construction with transverse frames and fore and aft running plates. Often longitudinal keelsons are welded to the floor timbers, both members then being provided with notches as shown.

Fig. 7 shows transverse frame system with transverse plating. Formerly some difficulties were encountered in welding longitudinal seams, so the longitudinal plating for smaller vessels was replaced by transverse plating as diagramed here.

Fig. 8 demonstrates spanner system where frames are welded on separate small legs. This can be

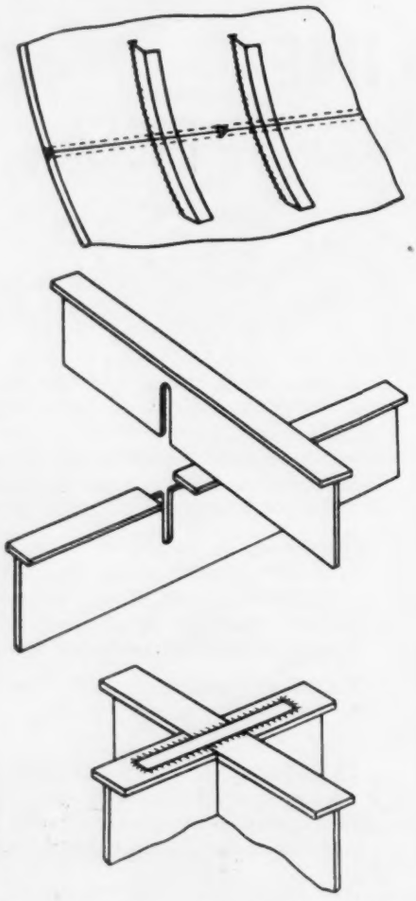


Fig. 6—Transverse frame with longitudinal plating

arrived at still more simply by a cut-out scantling which is obtained by zigzag cutting of high I-beams.

Fig. 9 shows longitudinal frame system and longitudinal plating, sometimes referred to as the "Isherwood" system. While the longitudinal frame is used, fore and aft shell plating is retained.

In Fig. 10 is shown the pannell system, of Dutch origin. In this method, the hull is reinforced by longitudinal and transverse frames. Cross frames are notched for welding in the lighter longitudinal frames.

The hull-flange system, not shown, also is of Dutch origin. Here the hull is made of a number of relatively small shell-strakes of which every other one is of constant width. Both longitudinal edges of these strakes are flanged so the strakes of constant width get an elevated flange and those of intermediate deviating widths are provided with a lower flange.

Use of Welding Spreading

In using this latter method to construct an all-welded motor yacht, 8.70 x 2.44 meters, the whole ship's body was made to rotate on a longitudinal center line by using round capstans welded fore and aft. These were used as journals to turn in bearings, permitting entire assembly to be rotated for downhand welding of all joints.

Important advantages of the hull-flange construction method are that number of joints is strongly limited and perfectly smooth hull exterior is obtained.

Welded steel construction has been adopted for canal boats, tankers, pleasure steamers and the like faster than with large ocean-going vessels largely because the decrease in weight, which is obtained by eliminating flanges and overlapping members, is a much higher percentage with smaller vessels than with larger ones. Nevertheless, welding is being employed widely in principal structural parts, bulk-

heads, engine beds, decks, deck houses, landing platforms, etc.

Especially in naval construction weight saving plays a much more important part. As far as arc welding is concerned, naval construction appears to lead the parade. For such work, the following types of joints are widely used for external connections.

The V-joint with 70 to 90-degree opening is most generally used on plates up to about ¾-inch in thickness. The X or double V-joint also with a 70 to 90-degree opening is applicable in plates ⅝-inch thick and larger. Naturally this type is limited to those connections accessible on both sides. Similarly the scalene X or double V-joint with one V about twice the size of that on the opposite side is similar to a V-joint which is beveled on the reverse side after welding. It serves to neutralize shrinkage and distortion always encountered in a V-weld. With correct preparation and proper welding procedure, a perfectly smooth connection can be obtained of extreme strength.

The U-groove is used mainly for plate above 1 inch in thickness, rarely encountered in shipbuilding.

In construction subject to extremely heavy stresses as in submarines, a perfectly homogeneous weld is essential. Usually this is obtained by chipping out the back of the first weld and depositing weld metal to fill up the cavity. It is recommended to abutt both plates completely together and weld with a U or V-seam to within about 3 millimeters of the opposite side, which then is chipped down to bottom of the first weld and filled in.

Chipping Often Not Practical

In many cases, chipping of the reverse side is not practical. Then special makeshifts such as placing a strip under the opening during welding and subsequently removing it are employed. Another method used successfully is to attach a thin strip of flat iron or half-round iron at the back of the seam. Then simultaneously with welding of the joint this strip is welded to the plate, too. It is left in place. It is also possible to use underlay strips of special shapes such as those with ridges or grooves but results are practically the same as with flat strip.

Frequently welding and riveting are combined. In these instances, considerable leakage was encountered where the welded seam came near the caulking in the riveted plate. Usually the packing material was burned, giving rise to early leakage. However, it was discovered that utilizing asbestos stoppers or packing instead of the usual cotton, tar and shellac stoppers eliminated leakage even when welded beads were run right across the riveted and caulked joint.

Use of asbestos packing has been extremely valuable in connection with extensive application of welding on latest submarines where it greatly aids in obtaining water and oil tightness.

Serious cracking developed when welding high-tensile steels in cold weather near doors which permitted strong drafts to fall upon the work. When the shop was sealed against drafts and doors kept shut, no difficulty from cracks was encountered.

Effect of weather conditions also was noticed in working on a structure outdoors which was subjected to a rainstorm when welding was partly finished. Afterwards it was noted that welds upon which work had been done just prior to the rain were so cracked that they had to be renewed completely. X-raying of all other welds showed them to be without a flaw, indicating the sudden decrease in temperature

(*Please turn to Page 75*)

Fig. 7. (Upper)—Transverse frame with transverse plating. Fig. 8. (Lower)—Spanner type

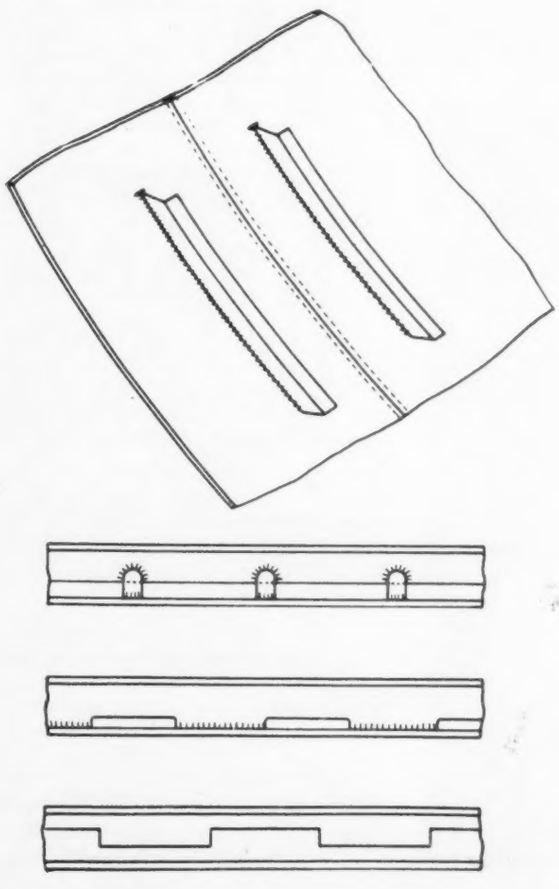
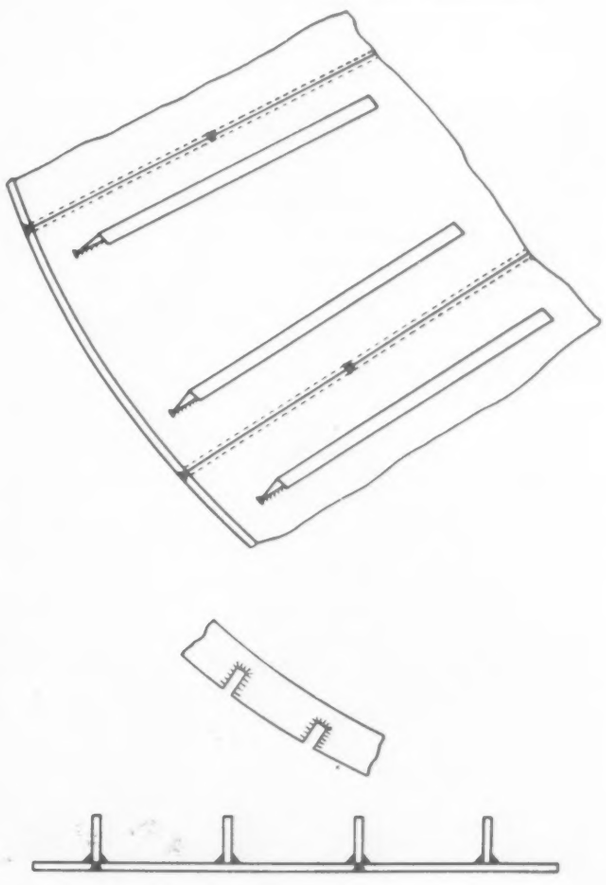


Fig. 9. (Upper)—Longitudinal frame with longitudinal plating. Fig. 10. (Lower)—Pannell type construction



Heat Treating Irons

(*Continued from Page* 47)

found to have a distinctive place.

Fig. 4 shows microstructure of a camshaft produced to retain spheroids of cementite within the hardened structure. Hardened portion of shaft is confined to the cam, remainder of shaft having the structure shown in Fig. 5. It is possible to identify a number of these various constituents, suggesting the valuable properties made possible by a controlled heat treatment designed to produce these structures in combination. In other words, heat treatment need not produce a single metallographic constituent unless this is desired as it is possible to alter these physical properties to obtain specific results.

Bull's-Eye Structure

The bull's-eye type of structure is well-known and has been recognized in the industry for many years. Under a microscope it appears somewhat similar to the pearlitic area in Fig. 1 where a temper-carbon nodule is surrounded by a white area of iron in a matrix of pearlite, the dark constitutent in this micrograph. In a metal of this kind, the typical bull's-eye structure just described characterizes the entire metal cross-section. Structure is essentially pearlitic, interrupted by islands of ferrite in the center of which will be a temper-graphite nodule.

This typical structure can be modified still further by heat treatment. For instance, temper-carbon nodules may be large or small, which means they may be comparatively few or many. Relative size of ferrite areas surrounding these nodules may be made greater or lesser. Nodules may be made to appear at extreme edge of the casting rather than under a decarburized rim.

A bull's-eye structure in heat-treated malleables has an adverse effect upon machinability, probably due to islands of ferrite which are soft and consequently tend to clog cutting tools. Therefore, it is frequently desired to eliminate ferrite completely. This may be done by a suitable heat treatment making the structure predominantly pearlitic and sacrificing the particular characteristics inherent in the bull's-eye structure.

The particular type of structure shown is especially useful where the metal must withstand certain temperatures and still maintain satisfactory physical properties. These temperatures, however, must be well below the critical point, about 1300 degrees Fahr., to retard any undesirable carbide reactons.

Small amounts of common alloying elements are useful at times. These malleables will not grow under heat as will cast iron. Although they contain free carbon, it is present as temper graphite rather than as flake graphite found in cast iron.

As originally cast and before heat treatment of any kind, malleable iron has a structure similar to that in Fig. 6 and is known commercially as hard iron. Carbon is present only in the form of carbide of iron. There is no free carbon or graphite in the structure. A most noticeable feature in microstructure of this material is the splines which cut across the structure in a more or less regular manner. These are known to be plates of primary cementite. They are extremely hard and are modified by heat treatment. Obviously the presence of such a constituent within the metal tends to make it brittle. In fact, this constituent is solely responsible for the extreme brittleness of hard iron.

Structure Changes

First thing occurring when hard iron is annealed is a change in the structure of this primary cementite. Graphitization begins in this constituent, the formation of temper-carbon nodules taking place first of all by the decomposition of primary cementite. This proceeds most rapidly at high annealing temperatures. Its decomposition is so well recognized in the industry that it indicates completion of first stage of high-temperature annealing. Free cementite in a malleable iron structure is regarded as sufficient proof that the high-temperature portion of the annealing period has not been carried out to completion.

It is possible to modify the typical hard-iron structure by various means. These will change the form of the primary cementite as usually produced. Heat treatment or alloying will do it. The structure is influenced primarily by pouring temperature of the original hard iron. The higher this temperature, the more pronounced will these splines become. Their form may be modified short of graphitizing by a heat treatment designed to change their structure to eliminate the large columnar form and to replace it by a more nearly spheroidal structure. In the latter form, this constituent will respond to heat treatment much more readily than will conventional structures.

Result, the extreme brittleness of a high-carbon base material is removed yet it retains the strength and wear resisting properties of the agglomerated carbides and still is resistant to a certain amount of shock. A material of this kind should have many useful applications.

Malleable iron of the usual type

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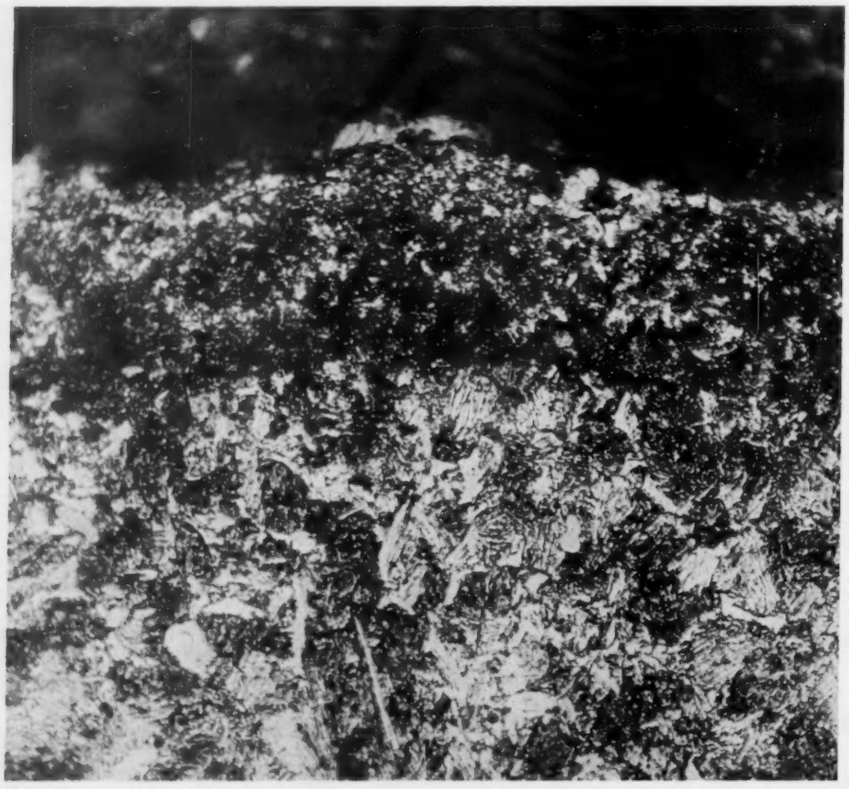
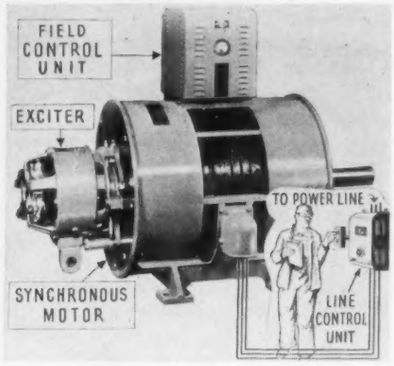


Fig. 7—Properly heat treated malleable iron showing no decarburization at edge. At 500 diameters

"Packaged" High-Speed Synchronous Motor

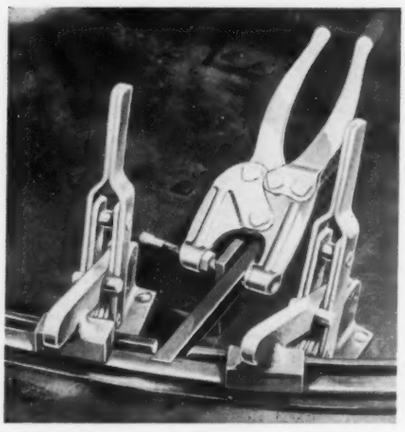
■ Electric Machinery Mfg. Co., 1331 Tyler street, Minneapolis, offers a "packaged" high-speed synchronous motor. Construction simplifies installation and wiring, reduces space



requirements and lowers first cost. Wiring is the same as for a squirrel-cage induction motor. Motor includes an exciter, mounted on top of V-belt driven motor, and a field-control unit. Exciter and field-control unit are wired to motor at factory. Motors are available up to 350 horsepower at 1800 revolutions per minute.

Clamping Tools

■ Detroit Stamping Co., 3445 West Fort street, Detroit, has developed two clamping tools, both suitable for use in the aircraft industry and for clamping and holding other types of work in production, where clamping

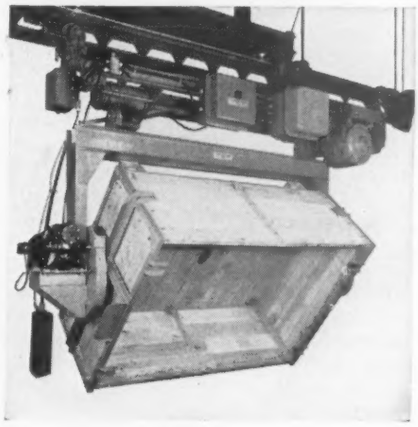


space is limited. Rapid action De-Sta-Co toggle clamp No. 220, Aviation model, measures but 1 29/32 x 1⅝ inches at base. Raising of operating handle delivers a pressure ratio of 33 to 1 to clamping arm. Rapid action De-Sta-Co toggle pliers No. 460, Light Duty model, measures but 6 15/32 inches long overall. Lock nut allows for rapid adjustment of clamping head from 0 to 11/16-inch spacing to accommodate varied thicknesses of work. Closing of handles exerts a pressure ratio of 75 to 1 at the clamping or biting end of pliers.

Box Grab and Tramrail Carrier

■ Cleveland Tramrail division, Cleveland Crane & Engineering Co., Wickliffe, O., has developed full-rotation box grab and tramrail carrier suitable for conveying materials in a wide range of industries. Boxes may be turned to any position by means of a gear-motor drive.

Grab is especially desirable where gradual dumping is required. Boxes are securely clamped by means of a handwheel located at end opposite gear-motor rotating mechanism. Unit illustrated accom-



modates boxes 48 inches wide, 72 inches long and 30 inches deep, and will carry 2000 pounds of materials. It has a full load hoisting speed of 20 feet per minute and travel speed of 150 feet per minute. Push-button station is used for all operations, including turning. Although box illustrated is wood, steel boxes have been handled with equal success. Grab also may be used for handling crates or machinery, etc., which is to be turned or rolled over. They can be furnished for smaller or larger boxes and for loads up to 5 tons.

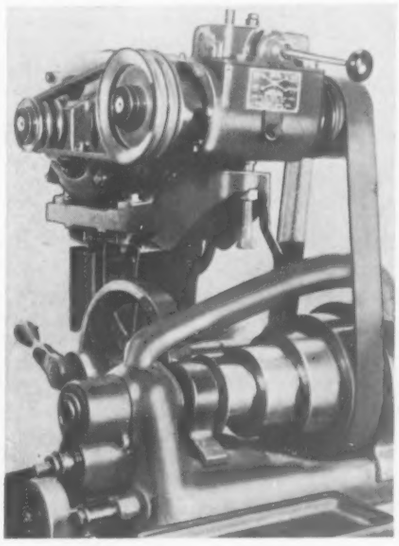
Electric Hoists

■ Shaw-Box Crane & Hoist division, Manning, Maxwell & Moore Inc., Muskegon, Mich., announces addition of two hoists to their Load Lifter Jr. line. Hoists are of low head, wire rope, drum type built for heavy duty service. On both sizes the hook in its highest position comes to within 12¼ inches of the bottom of beam on which it travels.

They are available in lug suspension, hook suspension, and combined with a push ball bearing trolley for operating on either I-beams or special monorail track sections. Featured in the design and construction are light weight, forged steel gearing and standard 2-gear reduction drive. Hoists are equipped for either pendant cord or push button control.

Speed Transmission

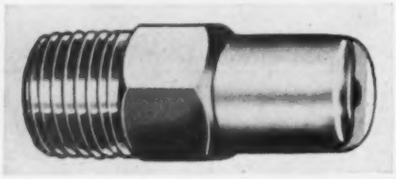
■ Western Mfg. Co., 3428 Scotten avenue, Detroit, has placed on the market four speed transmissions for application to cone driven machine tools. Three models are available: Master, for 1 to 5 horsepower, Major, for 5 to 10 horsepower and Super, built to specification for machines requiring larger than 10-horsepower motors. The four selective speed changes (forward and reverse) through one lever of the automotive gear shift type are 1:1, 2:1, 3:1 and 4:1. Transmissions come complete with brackets which provide for at-



tachment to turret lathes, milling machines, shapers, radial drills, lathes, planers, screw machines, gear cutters, boring mills, die sinkers, slotters, bolt cutters and other machine tools.

Flat Spray Nozzle

■ Spraying Systems Co., 4021 West Lake street, Chicago, announces flat spray nozzles for metal cleaning and



processing to be used wherever spray patterns are overlapping. It has a slightly heavy center and can be had in a number of different spray angles. Nozzles have ¼-inch male pipe connection. Capacities range from 1.5 to 3.5 gallons per minute at 10 pounds pressure and 3 to 7 gallons per minute at 40 pounds pressure. Standard stock construction is brass or all iron.

Lift-Grip Truck

■ Towmotor Co., 1226 East 152nd street, Cleveland, offers a truck with a lift-grip feature. Grip feature makes possible a truck taking much

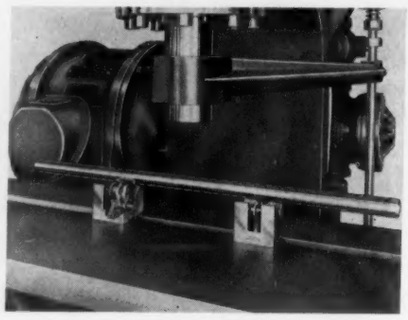
larger loads per trip, allows faster travel and permits neater, more accurate stacking because pallets can be loaded to full height of stack. Upper jaw or spring-tension grip is removable when truck is needed for handling other types of material.

Secondary Transformer

■ Thomson-Gibb Electric Welding Co., Lynn, Mass., has introduced a tubular secondary transformer which provides increased transformer efficiency with more effective water cooling and freedom from clogging and rust. Transformer is of high conductivity, seamless copper tubes of large cross section, providing large, nonclogging water chambers. Tubes are bent to U-shape and then flattened. The ends are left round and are assembled by brazing into terminal blocks. Water connections are made through the sides of the terminal blocks. Core of transformer is built up of silicon steel. Frame is designed to support core and transformer assembly. Primary coils are impregnated with insulating varnish and thoroughly baked. All insulating materials are fireproof.

Combination Test and Straightening Block

■ Greenerd Arbor Press Co., Nashua, N. H., has designed combination test and straightening blocks to speed up operation of straight-



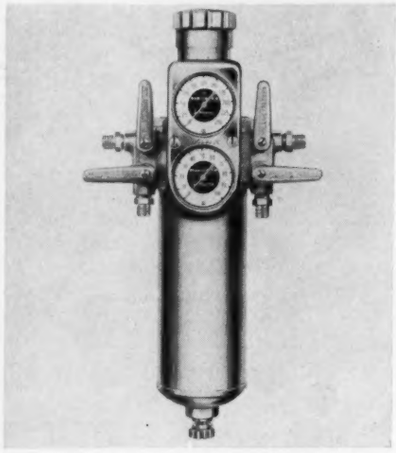
ening round shafts that are either turned or ground, such as motor shafts, spindles or tubing. Blocks are furnished for straightening shafts from ½ to 1-inch diameter, from 1 to 2 inches diameter and from 2 to 3 inches diameter.

V-Belt Drive Blower

■ Autovent Fan & Blower Co., 1805 North Kostner avenue, Chicago, has introduced a new V-belt drive blower which can be set up for almost any motor combination. Adjustments can be made on the job and replacements can be obtained from stock due to use of standard equipment throughout. Blower arrangement involves a uniblade type H blower operated by a standard frame motor equipped with a suitable V-belt drive. Motor is mounted on a steel pedestal base, built integral with blower housing. It takes little space and can be mounted with no trouble as there is no motor base to be bolted down.

Air Transformer

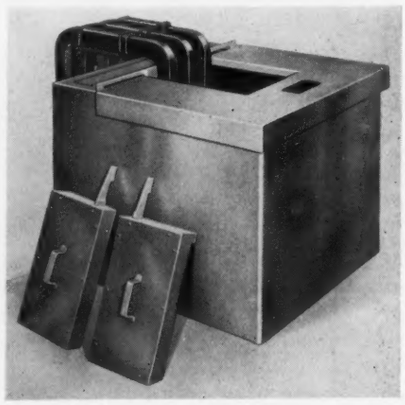
■ DeVilbiss Co., Toledo, O., has developed type HLC air transformer which feeds the paint spray gun clean, moisture-free air at uniform regulated pressure. It handles more than 50 cubic feet of air per minute, with a minimum of pressure drop. It will pass ample air for two



production spray guns in continuous and simultaneous operation or for three spray guns in ordinary, intermittent production use. Constructional features include large synthetic rubber regulator, diaphragm, refined operating mechanism and regulator knob. Extra large condensing chamber offers greater air expansion and more thorough condensation of moisture. Enclosed pressure gages with modern dial treatment and a die-cast body complete the modernistic style of transformer.

Electrode Furnace

■ A. F. Holden Co., New Haven, Conn., announces 3-phase electrode furnace having vertical individual adjustable electrodes, which may be used on narrow width of this furnace up to 30 inches in length. Incorporated cover plate permits easy



loading or unloading. Hand-operated covers are furnished for over-night shutdowns or small individual loads. Furnace also may be loaded from three sides.

Hi-Tensile Steel Ships

(*Concluded from Page 71*)

from the rainstorm to be the cause of the defective joints.

Much steel used in naval work is galvanized. Presence of a zinc film offers some welding difficulties so it is usually removed by grinding just prior to depositing the weld. This assures good quality in the joint and does not subject the welding operator to the zinc fumes.

Tests of welded galvanized and ungalvanized plates showed that poor galvanizing gave insufficient penetration during welding with consequent porosity and early leakage at the joint.

Naval Authorities Interested

Naval authorities appear particularly interested in welded high-tensile steel construction as it permits heavier armaments and affords other important characteristics to the vessels obtainable in no other manner.

This especially holds true with submarines. Obviously, these structures make great demands on the welding. In such work it has been found absolutely necessary to follow these recommendations:

All welding must be done in a workshop away from drafts and excessively high humidity. Welding seams should be done horizontally, preferably in a position so weld metal will run to give the contour desired. All welding on the slipway must be shielded properly against atmospheric influences. Welding operators must be examined and re-examined regularly. Careful control of actual welding procedure utilizing X-ray examination as a check is important. The high-tensile steel used must be welded easily.

Submarines utilize weight saving of welded high-tensile steel construction to give greater diving depth and heavier armament. For instance, the diving depth of a boat of 1000 tons surface displacement can be increased not less than 30 to 40 per cent. Of course the economies can be divided among other factors, the following being a typical division: Added diving depth of 50 feet (15 tons), 2-inch greater metracentric height (20 tons), more ammunition and torpedoes (5 tons), heavier antiaircraft guns (4 tons), larger diesel engines giving greater surface speed (8 tons), larger storage battery giving greater submerged speed (9 tons), more fuel and lubricating oil allowing greater operating radius (4 tons).

Naturally, these savings can be divided differently or applied entirely to one or two of the above mentioned improvements. Similarly, the safety coefficient of the compression strength of the hull can be raised to give an actual diving depth greatly exceeding the rated depth.

Torpedo destroyers utilize the weight savings to increase speed and radius of action. Arc welding saves at least 3 per cent of displacement or 45 tons, permitting a considerable increase in armanent, engine equipment, fuel stock or speed. Thus arc welding of high-tensile steels is becoming an increasingly important factor in naval construction.

All Metal Rheostat

■ The 50-watt all metal rheostat IRC Type PR-50 introduced by International Resistance Co., 401 North Broad street, Philadelphia, is claimed to reduce operating temperatures to almost half those obtained with conventional rheostats of same size. Due to rapid heat dissipating properties of aluminum in housing of rheostat and core on which resistance wire is wound, operation at full load in any portion of resistance winding down to 25 per cent of full rotation is possible without exceeding normal temperature rise by more than 30 degrees Cent.

YOUR POSITIONED WELDING WILL GO EVEN FASTER
with Murex
TYPE FHP

THE HIGH SPEED ELECTRODE FOR DOWNHAND FILLETS, DEEP GROVE WELDING AND COVER BEADS

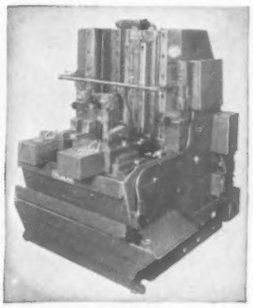
Easy to use at high amperages, with either A.C. or D.C. current, this recently developed electrode assures more rapid, more economical welding. Its slag is readily controlled and removes freely so that cleaning time is cut to a minimum and costs are reduced appreciably on heavy work where multi-layer welding is required. At the same time, little spatter is produced, weld surfaces are exceptionally smooth, and neat and good-looking concave fillets and cover beads are the result.

Write for full particulars and ask to have a Murex engineer call and show you what Type FHP can do on your production welding.

METAL & THERMIT CORPORATION, 120 Broadway, New York, N. Y.
Albany • Chicago • Pittsburgh • So. San Francisco • Toronto
"Murex Electrodes—Thermit Welding—Thermit Metals & Alloys."

Type FHP welds stand the gaff in these stripping tongs made by Shaw-Box Crane & Hoist Co.

Welders qualify readily with Type FHP for code welded work like this butane tank, made by Southwest Factory, Oklahoma City.



Oilgear Company, Milwaukee, builds well-designed, machines; wants clean, neat welds like Type FHP assures.

MUREX HEAVY COATED Electrodes
A COMPLETE LINE FOR EVERY WELDING APPLICATION

Investigate Thermit Welding, too—in use since 1902 for heavy repair work, crankshafts, etc.

Routing Raises Output

(*Concluded from Page 52*)

completed, the lathe is picked up by the craneman and is moved to the testing department. Here the machine is checked over, lubricated and oiled and then run in, slowly at first, then at increasing speeds. Although general checking and testing at this point is preliminary, it is by no means superficial.

The machine then is moved to the spray painting department. Note that travel of lathes on the erection floor always is in one direction —toward the shipping department. After filling, sanding and thorough washing down with naphtha, the machine is placed "on the griddle" for painting.

"The griddle" is a grating in the floor, through which air in large volume is exhausted downward. This simple expedient entirely eliminates the conventional painting booth and makes it possible for us to spray paint our machines "in the open" on the assembly floor within a few feet of other operations, no walls or partitions of any kind being necessary.

Fume-laden air of the downdraft is discharged into a large tank located directly below the grating. Here a continuous cascade of chemically-treated water effectively traps the solid material in the lacquer fumes. This solid material is not wasted. It collects in the tank in the form of a tough skin on the surface of the water, this being periodically rolled up like a rug and returned to the manufacturer for remaking into lacquer. Another advantage of this setup is that with the air suction downward instead of upward, and with the painter never called upon to hold the spray gun above his head (which would put him between the spray gun and the exhaust) he is never in a position where he can inhale the fumes.

After painting is finished, all masking which covers bright surfaces is removed and the lathe is given its final inspection. Here, again, special care is taken in checking for alignment and accuracy. The crating and shipping department lies just beyond and crating and loading are the next and final steps.

To sum up, in the layout of our plant, scheduling of operations, and routing and control of materials through the various departments, our guiding principle is this: "Coordinate the work, and then *keep things moving*—once they're started."

•

Enameling Irons

(*Concluded from Page 67*)

viscous to be controllable in the ladle.

It is realized that theoretically all the slag should remain behind in the cupola but in practice a certain amount passes through the cupola spout with the metal. In one instance, the limestone content was reduced from 70 pounds per ton of metal charged to 35 pounds per ton and no increase in sulphur pickup occurred.

Chemical composition of cast iron for enameling often is emphasized but it has been found important only as it affects the structure of the metal. For instance, good results were obtained when enameling iron between the following limits of composition, all of which gave irons with a microstructure similar to Fig. 1:

	Per Cent
Silicon	1.9 to 3.5
Sulphur	0.04 to 0.14
Phosphorus	0.3 to 1.65
Manganese	0.45 to 1.7
Total carbon	2.7 to 3.5
Combined carbon	0.3 to 0.6
Nickel	nil to 1.5
Chromium	nil to 1

The nickel and chromium were added deliberately to estimate what their effects might be if they were introduced by nickel or chromium-bearing scrap.

It is necessary that the manganese content be sufficient to combine with all the sulphur and so prevent formation of iron sulphide. This quantity is expressed in the following well known formula:

Manganese (in per cent) equals 0.3 per cent plus 1.7 times sulphur content in per cent.

A slightly higher manganese content than that required by this equation helps to densen the structure but amounts in excess of 0.7 per cent have not shown any material improvement in the enameling properties. It is common practice in England to use phosphorus contents in excess of 1.25 per cent for light castings but results obtained when enameling iron containing 0.65 to 0.75 per cent phosphorus indicate tendency toward fire-cracking is reduced by lowering the phosphorus content to this figure.

In production of enameling irons it is believed that if the utmost attention be given to their metallographic characteristics and if their chemical compositions be maintained within limits which will give the desired structure, a satisfactory enameling iron will be obtained.

Maximum permissible variation in chemical composition naturally depends on the type of castings produced and casting conditions. Further, the extent of any imperfections in the porcelain enamel resulting from casting defects depends upon the degree of workability of the enamel. Minute defects in the casting will cause defects in porcelain enamel of low workability, whereas enamels with a high degree of workability would be satisfactory over relatively great casting imperfections.

This article deals solely with irons and direct application of leadless type enamels to these irons. No ground coat is used and all castings are annealed and steel-grit blasted. This is standard practice in England.

It Pays to Use Dependable Wire Rope

When a wire rope fails, the equipment on which it is used is temporarily out of business, production stops, time is lost and labor is wasted... The best recommendation for "HERCULES" (Red-Strand) Wire Rope is its performance record, by which it continues to make and hold friends—year after year... In order to be suitable for all purposes, "HERCULES" is made in a wide range of both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type... If you will tell us how you use Wire Rope, we shall be glad to suggest the construction and type we consider best for your conditions.

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< < < HELPFUL LITERATURE > > >

(1)—Balancing Machines

Gisholt Machine Co.—32 page illustrated booklet No. 1079. A new line of static and dynamic balancing machines for locating and measuring unbalance in rotating parts is announced and described. Available in a number of sizes. Any size part can be tested. Explanations of the effects of unbalance in rotating parts are included, as are diagrams and descriptions of principles of modern methods of correction.

(2)—Geared Drives

Westinghouse Electric & Manufacturing Co.—34 page illustrated bulletin No. B-2159. Adaptations and developments of all types of geared drives are discussed. Included are single, double and triple reduction gearmotors; single and double reduction speed reducers; special vertical and right angle vertical geared drives; single and double reduction heavy duty mill units; horizontal speed reducers with shafts in vertical plane, and others.

(3)—Shapers

Rockford Machine Tool Co.—6 page illustrated bulletin No. 401.1. 16 to 28 inch "Hy-Draulic" shapers, newly redesigned are covered by detailed discussion, specifications and construction illustrations. Performance data is given and shaper accessories are presented. Other "Hy-Draulic" machine tools are described briefly.

(4)—Anti-Scaling Compound

E. F. Houghton & Co.—4 page illustrated bulletin No. 2-161, in which "Ferritrol", an anti-scaling compound for plain carbon steels subjected to high temperatures is described. Applications, performance and advantages of use are set forth. A list of other products is also given.

(5)—Oil Absorbent

Sta-Brite Manufacturing Co. — This bulletin describes "Sta-Brite," a product for use on industrial floors for absorbing oils and greases, reducing accidents, and fire hazards and adding to general cleanliness. A mineral product with no acid, alkali or chemicals added. Safe to use under all conditions.

(6)—Controllers

The Bristol Co.—Illustrated catalog No. 4050. Modern air-operated instruments and their applications are discussed. Bristol's "Free-Vane" principle of operation is explained. Flexibility of operation and simple hand adjustment are features. Various models for control of temperature, pressure, flow, liquid level, draft, humidity and pH value are covered.

(7)—Oil Circuit Breakers

Allis-Chalmers Manufacturing Co.—4 page illustrated bulletin No. B6023. Types D-20 and KD-20 switchboard oil circuit breakers for 600, 1200 and 2000 amperes; 15,000, 7500 and 5000 volts, 50,000 KVA interrupting capacity service are described. General dimensions and discussion of characteristics provide data on operation of these units. These circuit breakers have all three poles in one tank. Economy of operation and saving of space are advantages.

(8)—Cast Cutting Material

Crucible Steel Co. of America—Technical data sheet No. 51, in which "Rexalloy", a new cast cutting material is described. What it is, what it does and how to use it are fully covered. Performance data and available sizes are given. "Rexalloy" is said to cut up to 200 per cent faster than ordinary high speed steels. Several other data sheets cover specific case studies of this material.

(9)—Universal Grinders

Brown & Sharpe Mfg. Co.—20 page illustrated catalog No. 105, covering Nos. 2, 3 and 4 universal grinding machines. Flexibility of wheel set-up completely universal wheel stand, permanent mounting internal grinding fixture, complete unit headstock and wide range of speeds are features. Specifications are given and additional equipment is covered.

(10)—Fluorescent Lamps

General Electric Co.—4 page illustrated folder "A" giving essential data and prices on the complete line of fluorescent Mazda lamps and auxiliary equipment. In addition to incorporating all necessary information on fluorescent lamps in one folder, it contains tables on power-factor correction and several connection diagrams.

(11)—Switchgear

Delta-Star Electric Co.—16 page illustrated bulletin No. 72-D, describing a complete line of type "M" instrument, control and auxiliary switches. Features are the unit type construction permitting assembly of any number of stages, and the flexibility of four-way operation—right—left or push-pull. Seventy control diagrams are illustrated.

(12)—Hydraulic Presses

Hannifin Mfg. Co.—4 page illustrated bulletin No. 50. The new sensitive pressure control for Hannifin hydraulic presses is described. Specifications are given for 25 ton, 35 ton, and 75 ton straightening presses. The exclusive finger-tip control cycle of the sensitive pressure control is covered in detail.

(13)—Electrical Precipitation

Research Corporation of New York and Western Precipitation Corporation of Los Angeles—22 page illustrated booklet describing the Cottrell Process of electrical precipitation for smelters, iron blast furnaces, cement mills, chemical plants, power plants, and gas works, for recovery of materials, abatement of nuisances and cleaning of all kinds of gases. Many installations are shown and described.

(14)—Galvanizing

Empire Metal Co.—4 page bulletin on "Silver Metal", a metal that is added in extremely small amounts to zinc galvanizing baths to produce whiter work, fewer rejects and lower working temperatures. Smaller amounts of zinc are needed and kettles are said to last longer in service. Available in three forms; for hot-dip process, sheet galvanizing and for continuous wire.

(15)—Kennametal

McKenna Metals Co.—32 page illustrated catalog No. 3. Contains complete descriptions, drawings and recommended uses for standard Kennametal tools and blanks for turning, boring and facing steel and other metals. New features of the catalog include descriptions and drawings of the new styles 19 and 20 tools for shapers and planers.

(16)—Forging Hammer

Chambersburg Engineering Co. — 16 page illustrated bulletin No. 1275. The motor driven Chambersburg pneumatic forging hammer available in three types is described. Specifications, advantages, design and construction are fully covered.

(17)—Springs

Lee Spring Co. Inc.—4 page illustrated "Scientech" specification form for determining the proper type or types of spring design to suit requirements. Various kinds of metals for springs are discussed and their design to suit different needs is covered.

(18)—Motor Truck Scales

Toledo Scale Co.—Illustrated brochure No. 2415, in which suggestions concerning the installation and use of motor truck scales, and National Bureau of Standards regulations are covered. Three new lines of scales are described. Industrial applications are shown.

(19)—Cranes

The Whiting Corp.—86 page illustrated loose-leaf type catalog, covering "Tiger" cranes. Design, operation and outstanding features are included. Specifications are given and many typical installations are shown.

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(Continued)

(20)—Bearings

Bartlett Hayward Div., Koppers Co.—Illustrated booklet describing the new "Fast's" multiple oil film bearings. These bearings carry their loads on a plurality of perfect wedge-shaped oil films, preventing metallic contact and wear and eliminating vibration and noise. The hydrodynamic theory of lubrication is employed in their design. Dimensions, load capacities, recommended shaft sizes and specifications are given.

(21)—Punches and Shears

Beatty Machine & Manufacturing Co.—12 page illustrated bulletin No. 1500-A, describing toggle driven beam punches and presses for punching extra large structural shapes and manufactured parts. Advantages claimed, include more die space, deeper throat, longer stroke, greater capacity, higher pressure, less power consumption, lower maintenance and less floor space. Specifications are given.

(22)—Thermometers

The Foxboro Co.—38 page illustrated bulletin No. 198-2, describing a complete line of recording thermometers for every industrial use. Four classes of thermometers discussed are; vapor pressure, gas pressure, liquid expansion with bi-metal coil compensation, and liquid expansion with twin-unit compensation. Methods of selection and installation are covered.

(23)—Roll Grinding

The Carborundum Co.—4 page illustrated bulletin "A Forward Step In Roll Grinding" in which a new series of grinding wheels for roughing, semi-finishing and ultra finishing of all kinds of rolls is discussed. Suggested gradings for various types of work are given in convenient table form.

(24)—Positive Printing

Ozalid Corp.—8 page folder No. OZ-175, describing a new method of reproducing engineering drawings and other line material with black lines on white paper. No washing or use of solutions is necessary in the process. Details of methods employed, equipment used and advantages of the process are given.

(25)—Pickling

The International Nickel Co., Inc.—6 page illustrated bulletin presenting the characteristics and properties of Monel metal that make it advantageous for use in pickling. Crates, baskets, tanks, chain and miscellaneous applications are covered. Engineering properties and fabrication of Monel are discussed.

(26)—Induction Motors

Reliance Electric & Engineering Co.—4 page illustrated bulletin No. 118, presenting the Type "AA" squirrel-cage induction motor, for two or three-phase alternating current, continuous duty. Structural and design details are covered and steps in manufacture are shown. General specifications are given.

(27)—Chain

American Chain and Cable Co. Inc.—Illustrated catalog No. 365. Covers welded chains, including "ACCO" registered sling chains, "Endweldur" chain, a new development, and iron crane chain. The book shows how to measure chain, gives information on finishes and metals used in chain manufacture, and contains specification tables of sizes, dimensions, weights, tensile strengths and safe working loads.

(28)—Abrasive Blasting Mill

The American Foundry Equipment Co.—4 page illustrated bulletin No. 35, in which the small capacity "Wheelabrator" airless abrasive blasting mill is announced. This unit is 15 by 20 inches in size and is particularly useful in heat treating shops, forging plants and small foundries. Mechanical features and method of operation are described.

(29)—Motor Bases

The American Pulley Co.—16 page illustrated bulletin No. MB38A, describing the American tension control motor base for automatically adjusting belt tension on motors in any position. Available in several standard sizes. This bulletin gives complete specifications, dimensions, advantages and shows several installations.

(30)—All Purpose Crane

American Hoist & Derrick Co.—16 page illustrated catalog No. 600-L, describing the American Eagle all purpose crane, a light, one man operated unit. Flexibility and economy are features. Traveling speed up to 20 miles per hour. It will handle up to 7½ tons with hook, magnet or clamshell bucket. Specifications are given.

(31)—Screw Drivers

Stanley Tools Div., The Stanley Works—25 page illustrated booklet No. 135. Screw drivers for industrial use in a wide variety of types, with wood and composition handles are covered. Power bits for use with Phillips screws, offset drivers, etc., are also described. Prices are given.

(32)—Bronze Chains

Link-Belt Co.—4 page illustrates folder No. 1804. Bronze drive and conveyor chains for resisting destructive effect or organic and inorganic acids are covered. A table shows at a glance each type's ability to withstand various acids.

(33)—Conveyor

The Jeffrey Manufacturing Co. — 12 page illustrated catalog No. 730, describing the Jeffrey "Mass-Flo" conveyor for handling a wide range of dry bulk materials. Advantages include materials handling without breakage, economy of installation and operation, self-cleaning and self-feeding, operates at full or partial load, and conveys or elevates with equal ease. Charts of capacities and drawings of typical arrangements and dimensions are given.

(34)—Broaching Machines

The Oilgear Co.—24 page illustrated bulletin No. 23001. Fluid power variable speed single slide vertical surface broaching machines with automatic shuttle tables are described. Economical production, accuracy and finish are features. Specifications are given. Numerous typical set-ups in various industries are shown and described.

(35)—Electrical Alloys

Driver-Harris Co.—56 page illustrated data book No. R-40, on electrical heat and corrosion resisting alloys, including "Nichrome". Engineering data and full descriptive matter on characteristics, applications, temperature resistance and weights are given. Available in wire, ribbon, strip, rod and sheet form. Charts and tables give useful information.

(36)—Sheet Gauger

Streeter-Amet Co.—4 page illustrated bulletin No. GG-92839, describing the "Guyer Gauger", a mechanical micrometer for checking the gauge of sheets. Use of this unit is said to eliminate faulty sheets in stamping, reduce losses and costs, and produce more satisfactory work. It is said to operate rapidly and accurately under shop conditions.

(37)—Precision Saws

The Doall Co.—4 page illustrated bulletin, describing the complete selection of precision saws available from this company. Recommendations on saw selection for various types of metal cutting are made. The unique method of packaging these saws is shown. A complete price list is included.

(38)—Wire Rope

MacWhyte Co.—8 page illustrated bulletin "Sweet Music To Wire Rope Users", in which Monel wire rope is covered and several installations described. Corrosion resistance of this product is a major feature. Tables of tensile strengths and weights are given. A list of distributors is included.

(39)—Photomicrography

Bausch & Lomb Optical Co.—24 page illustrated catalog No. E-21 and price list. Various types of photomicrographic equipment, optical accessories and ultraviolet optical accessories are described in detail. Factors in photomicrography are discussed.

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Waste-Heat Boilers

(*Concluded from Page* 64)

U-bend superheater elements. A single steam drum of 48-inch diameter surmounts the unit.

A year's operation of the first unit installed is typical of the performance of the other units:

Hours operated 7803
Per cent of time operated.. 89.2
Average kilowatts generated by gas engine..... 3480
Average boiler horsepower. 398
Average lb. steam per kilowatt-hour 3.45

During this period, engine operations were handicapped by lack of gas due to curtailed plant operations, but under normal conditions this unit operates 96 per cent of the total time.

Much progress in power plant economy has been made during the past ten years, including regenerative feed-water heating, steam reheating, economizers and air preheaters, high steam pressures and temperatures, binary and mercury-steam cycles. Bethlehem's experience has indicated, however, that advantageous as these improvements have proved to be in most applications, their complications are an obstacle when contrasted with the simpler gas engine and waste-heat boiler combination for the type of load found in the steel industry.

Plant performance of the gas-engine waste-heat-boiler combination with waste-heat steam used on a modern turbine indicates 9500 B.t.u. per kilowatt hour plant sendout which compares favorably with the efficiency of modern central stations.

Following the experience gained from the first waste-heat boiler installation in 1935, the later installations were designed with a somewhat larger capacity and have a greater allowable draft loss.

By way of illustration, the comparison presented in Table II was made between the present operating gas engine units in combination with waste-heat boilers, and a relatively good turbine operating in a mid-western steel plant; also with a "theoretical" unit of such unusually high efficiency as a turbine with 1250-pound steam pressure and a temperature of 880 degrees Fahr.

TABLE II—Comparison of Waste Heat Boiler with Modern Steam Units

	Waste Heat Boiler Blast Furnace Gas Engine Unit	Actual Mid-West Turbine Unit 275 lb. 615°F.	Theoretical Turbine Unit 1250 lb. 880°F.
General Plant Requirements—			
Total iron produced (tons)	50,000	50,000	50,000
Power generated (kw. hr.)	14,000,000	14,000,000	14,000,000
Steam required for process (lb.)	62,000,000	62,000,000	62,000,000
Per cent total heat input received by electric power and process steam unit	59.7	26.2	45.0
Total blast furnace gas required (cu. ft.)	2,439,000,000	4,900,000,000	3,620,000,000
Per cent of waste heat boiler requirements	100	201	148.5
Bituminous coal equivalent in tons	8,060	16,200	12,000
Loss per year at $5.00 per ton of coal equivalent	.....	$489,800	$236,400

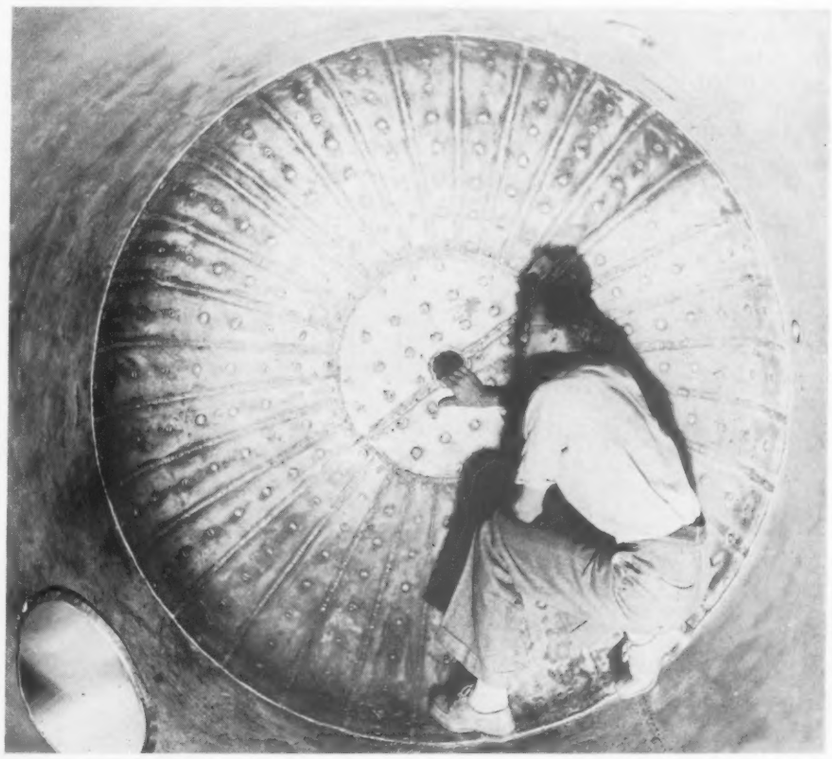
The Bethlehem gas engine, completely renovated and with a waste-heat boiler added, has shown better overall recovery than is indicated for the most modern turbine units in similar service. Application of waste-heat boilers has reduced operating costs to the extent that such a combination is a most logical one at Bethlehem.

As the size of the gas engine increases, experience indicates that the advantage becomes still greater. In fact, compared with a turbine station, the gas-engine waste-heat-boiler system requires only half the amount of fuel for the same power output, releasing the remaining half for metallurgical furnaces. The combination has met the initial cost of installation and resulted in a lower operating cost. Also, due to the higher heat recovery of this combination, its advantage becomes greater with increasing price of fuel.

Odd-Job Scraper

■ Gar Wood Industries Inc., 7924 Riopelle avenue, Detroit, has placed on the market a 3-yard 2-wheel hydraulically-operated scraper. Known as Model 23, it handles odd jobs which must be completed expediently. Scraper, used with tractor, digs under positive pressure in all kinds of soil and loads, hauls and back dumps.

Monel Metal Sheet Plug Welded to Accumulator



■ Steel accumulators 6 x 16 feet were recently lined with 3/32-inch monel sheet by Black, Civalls & Bryson Inc., Oklahoma City, Okla. Head liner illustrated is orangepeel construction using ½-inch holes on 4-inch centers plug arc welded with ⅛-inch monel coated electrodes. All periphery welds were made with 5/32-inch monel-coated electrodes. Welding of plug periphery was done first, then center of plug was filled in after cleaning of periphery weld.

Control of Fuel-Air Ratio in the Operation of Blast Furnace Stoves

■ A LEADING steelmaker in the Pittsburgh district holds the gas consumption of blast furnace stoves at an exceptionally low point and the thermal efficiency of these units at a high predetermined value by an ingenious application of a standard recording flow-controller. The instrument automatically regulates the operation of a pneumatically actuated lever motor and pressure regulator—the latter device controlling the blast to the stoves. The setup is simple and the control effected is sensitive and extremely close.

As shown in accompanying diagram, the pneumatic controller incorporates a mercury manometer connected to a pitot tube inserted in the blast-furnace gas line. A pressure tube is connected in the air line to the blast blower. Variations in gas flow cause the actuating mechanism to admit more or less compressed air to the diaphragm valve of the lever motor, thereby securing exceedingly delicate adjustment of the butterfly valve governing the air supply to the blower.

The results have been quite satisfactory, a considerable saving in fuel and a marked increase in stove efficiency being obtained.

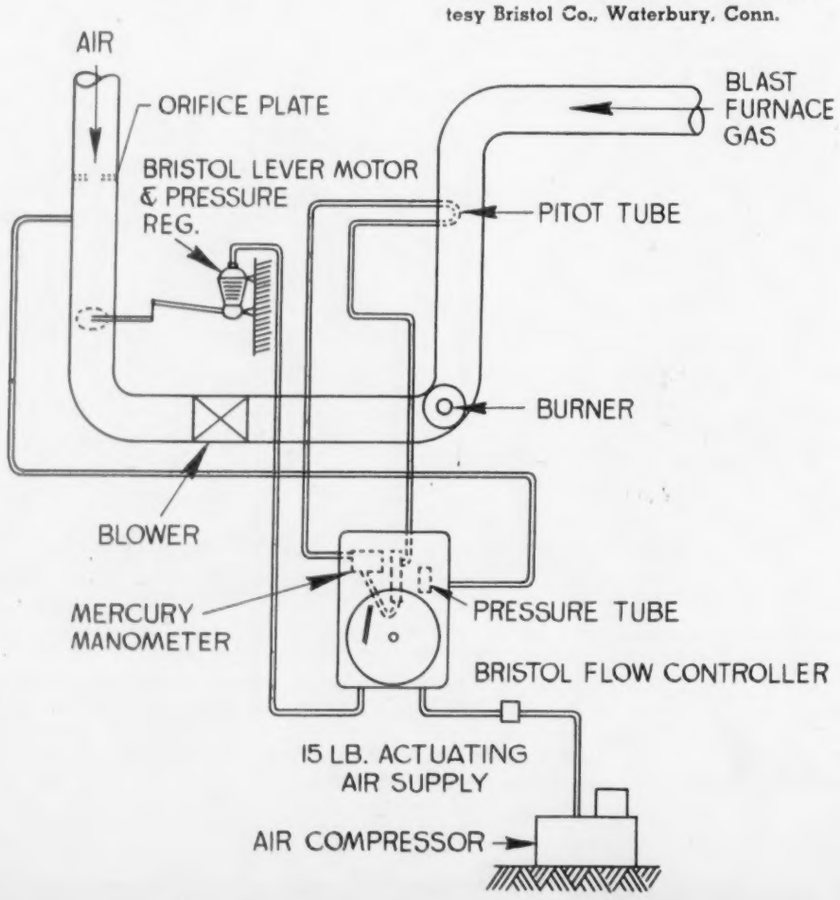
The installation was experimental, the control being put in on trial so the first six months record was an acid test of the system. On installation, the control mechanism of the instrument was set for the best attainable operation under carefully predetermined (test) conditions of full blast, with the butterfly damper in the air line about two-thirds open and the adjustment of the actuating control valve set accordingly.

With final setting thus determined empirically, the control has functioned with consistent sensitiveness, calling for no recalibration and adjustment of the instrument at all. Such minor fluctuations in gas consumption as have occurred, no B.t.u. (gravity) controller being provided, have been limited to those occasioned by slight changes in the B.t.u. value of the gas.

Under all conditions of blast-furnace operation there has been quite an appreciable saving in fuel as compared with results under former less dependable control. Also, the thermal efficiency attained has been so greatly improved that at no time has it been found advisable to modify the control range of the instrument—as can easily be done.

The system appears a simple method of obtaining a considerable saving in fuel along with a marked increase in stove efficiency.

Schematic diagram showing layout of equipment for automatic control of fuel-air ratio to blast furnace stoves. Courtesy Bristol Co., Waterbury, Conn.



Heat Treating Irons

(*Concluded from Page 72*)

may be heat treated after manufacture as well as during the process of manufacture. This is contingent, however, upon elimination of the decarburized rim found on most malleable iron castings. This rim is not only free from combined carbon but also free from temper graphite so when the casting is reheated to bring the carbon into solution, there is no carbon in these areas so the metal does not respond and remains soft after passing through a hardening operation.

Where this decarburized edge is removed by machining, the metal will respond to heat treatment since carbon then extends to extreme edge of piece. In other cases, it is necessary to correct this decarburized condition during heat treatment. This is done by action of a carburizing gas, eliminating decarburized areas and making subsequent heat treatment effective.

Obviously fully annealed malleable iron will require a different treatment, at least to begin with, than the so-called pearlitic malleables. First step will involve resolution of any carbon present in graphitic form, often requiring considerable time for the carbon to diffuse uniformly throughout the metal section, necessary for positive control of successive steps. Next, a variety of heat treatments may be utilized similar to those previously described. Such treatments really only revert the metal to a condition similar to that existing in hard iron at early manufacturing stages. The difference is that a certain amount of combined carbon has been removed during subsequent heat treatments.

Fig. 7 shows a piece of malleable iron heat treated as above. Note absence of decarburization at edge and also the good hardened structure which resulted from the treatment.

Here, then, is an outline discussion of a variety of materials which can be produced from malleable iron base metal. These materials can be made by the usual methods and with the use of well-known heat-treating procedures.

Their use for engineering requirements is not as widespread as their merit deserves. It is suggested that by collaboration with the manufacturers it will be possible for engineers searching for materials of special properties to find these materials among the malleable iron group and especially within the class of heat-treated malleables.

Seasonal Uplift Late; Buying Trend Better

Export demand heavier. Structural market expanding with larger private interest. Steel rate holds

MARKET IN TABLOID ★

Demand

Gradual seasonal increase in some lines.

Prices

Steady, with shading less evident.

Production

Holds unchanged at 62½ per cent.

■ STEEL buying shows further moderate gains, with principal support resulting from inventory depletion by domestic consumers and from export markets. Sellers of the commoner products report an increasing number of consumers are entering the market for the first time in several months.

This results in a larger gain in number of orders than in total tonnage and in some cases has been insufficient to check the downward trend of production, but the point of balance between demand and production is believed near.

Rate of decline in steel production, which has been slowing in recent weeks, apparently has reached a resting place and last week was unchanged from the preceding week, at 62.5 per cent. Recovery of 2½ points at Pittsburgh served to balance slight losses in several other districts.

Current export demand is the heaviest since the war started. It is strongest in bars, sheets, semifinished and tin plate, though foreign business in the latter has lagged in recent weeks. Alloy bar manufacturers are receiving a large number of inquiries, frequently involving special grades, apparently intended for military equipment manufacture. Relatively little shell steel has been bought, except some small-diameter material for antiaircraft projectiles. France, Holland and Sweden have been most active in the alloy bar market.

Building construction is expanding gradually. Bethlehem Steel Co. submitted the low bid for the 7000-ton Rainbow bridge at Niagara Falls, subject to commission approval. Two pending jobs in the Panama canal zone, for army barracks, lead the reinforcing market with 13,000 tons of bars. Recent river barge orders include 18 units, requiring 4700 tons of plates and shapes. Barge business this year has been the best ever experienced, in the opinion of some fabricators.

While railroad buying currently is light and scattered, many steelmakers see indications of additional freight car buying and some estimates run as high as 50,000 cars for the remainder of this year. Most steel booked for cars ordered last fall has been shipped to builders.

Backward weather conditions are hurting some products, notably wire. Deferred buying of pipe in the South is being compensated by a sharp increase. Standard pipe demand in the South is 60 per cent above that of February in the experience of some makers.

Merchant pig iron is moving somewhat better, March shipments being 10 to 12 per cent larger than in February. Foundries, especially those catering to machine tool and automotive manufacturers, are operating at a higher rate and agricultural implement builders are also taking fairly good tonnages.

High production of automobiles continues, total assemblies last week being 103,395 units, a drop of 2325 from the previous week. Chrysler output declined 4800 cars, which overcame increased production by remaining makers. General Motors increased 260, Ford 1675 and all others 540.

Scrap continues dull without indications of a marked change in the near future. Many brokers expect a dip when buying is started, followed by a quick rise, the usual pattern at the bottom of a movement. Many present quotations are nominal and dealers in many cases refuse to entertain bids by melters below the present level. STEEL's composite of steelmaking scrap last week declined 33 cents, to $16.25, lowest since early September. Purchases at Pittsburgh and Chicago were below previous quotations, while prices in the East continued without change. The iron and steel composite receded 2 cents to $36.84 as a result of scrap weakness.

Tin plate production has stayed its downward course at 53 per cent, with specifications steady and seasonal factors tending toward an upturn, especially in view of dissipation of inventory accumulated last fall.

In addition to Pittsburgh's increase of 2½ points to 57½ per cent, Cleveland gained 1 point to 74 per cent and Youngstown 1 point to 43 per cent. Wheeling made the greatest recession, 7 points to 73 per cent, followed by New England, 5 points to 65, Detroit 4 points to 78, Cincinnati 3½ points to 51 and St. Louis 2 points to 58. There were no changes in rate at Chicago, 59½ per cent; Eastern Pennsylvanaia, 60; Buffalo, 61; Birmingham, 78.

COMPOSITE MARKET AVERAGES

	Mar. 23	Mar. 16	Mar. 9	One Month Ago Feb., 1940	Three Months Ago Dec., 1939	One Year Ago Mar., 1939	Five Years Ago Mar., 1935
Iron and Steel	$36.84	$36.86	$36.83	$36.97	$37.18	$36.40	$32.36
Finished Steel	56.10	56.10	56.10	56.10	56.10	56.50	54.00
Steelworks Scrap	16.25	16.59	16.67	16.98	17.88	14.98	10.75

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week: Average for Last Month, Three Months and One Year Ago

Finished Material

	Mar. 23, 1940	Feb. 1940	Dec. 1939	Mar. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.25c
Steel bars, Chicago	2.15	2.15	2.15	2.25
Steel bars, Philadelphia	2.47	2.47	2.47	2.57
Iron bars, Chicago	2.25	2.30	2.15	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.225	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.15
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.15
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.20
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.45

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.00	2.00	1.98	1.92

Pig Iron

	Mar. 23, 1940	Feb. 1940	Dec. 1939	Mar. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$22.34
Basic, Valley	22.50	22.50	22.50	20.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	22.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	22.21
No. 2 foundry, Chicago	23.00	23.00	23.00	21.00
Southern No. 2, Birmingham	19.38	19.38	19.38	17.38
Southern No. 2, del. Cincinnati	22.89	22.89	22.89	20.89
No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	23.215
Malleable, Valley	23.00	23.00	23.00	21.00
Malleable, Chicago	23.00	23.00	23.00	21.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	28.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	21.17
Ferromanganese, del. Pittsburgh	105.33	105.33	105.33	85.27

Scrap

Heavy melting steel, Pittsburgh	$16.75	$17.75	$18.50	$15.75
Heavy melt. steel, No. 2, E. Pa.	16.00	16.31	17.60	13.375
Heavy melting steel, Chicago	15.25	15.75	16.25	14.25
Rails for rolling, Chicago	18.25	18.25	19.75	17.25
Railroad steel specialties, Chicago	18.50	18.50	18.50	16.25

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$3.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.00
Chicago, by-product fdry., del.	11.25	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast points	2.60c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast points	3.65c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast points	4.00c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.50c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.35c	3.95c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30 50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast points	2.60c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	3.95c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast points	2.70c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(Base, 20 tons or over)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast points	2.75c

Rail Steel

(Base, 5 tons or over)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast points	2.65c

Iron

Chicago	2.25c
Philadelphia	2.37c
Pittsburgh, refined	3.50-8.00c

Reinforcing

*New Billet Bars, Base**

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	1.90c
Gulf ports	2.25c
Pacific Coast ports	2.25c

*Rail Steel Bars, Base**

Pittsburgh, Gary Chicago, Buffalo, Cleveland, Birm.	1.90c
Gulf ports	2.25c
Pacific Coast ports	2.25c

**Subject to a deduction of 25 cents per 100 lbs. in lots of 20 tons or over of one size, in lengths of 30 feet or over, for shipment at one time to one destination.*

Wire Products

Pitts-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55

(Per pound)

Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.30c
Woven wire fencing (base C. L. column)	67
Single loop bale tie (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago-Birmingham (except spring wire)

Bright bess., basic wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

* Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

Alloy	S.A.E. Diff.	Alloy	S.A.E. Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.55	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.10
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast points	2.70c
Cooperage hoop, Youngs., Pitts.; Chicago, Birm.	2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown	2.80c
Chicago	2.90c
Detroit, del.	2.90c
Worcester, Mass.	3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68.5 off
Do. larger, to 1-in.	66 off
Do. 1⅛ and larger	64 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5 off; with nuts attached add 15%; bulk 83.5 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	67	70
⅝-1-inch	64	65
1⅛-1½-inch	62	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset, 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific coast ports	2.90c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75	off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
⅛	63½	54
¼	66½	58
1—3	68½	60½

Iron

¼	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½
9 and 10	64½	55
11 and 12	63½	54

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64
10-inch lap weld	63½
12-inch, lap weld	62½

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cut lengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	.....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1 "O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2¼"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Young., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young., Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to 41/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.45.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.00- 5.75
Connell. prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	10.50
Chicago, delivered	11.25
Terre Haute, del.	10.75
Milwaukee, ovens	11.25
New England, del.	12.50
St. Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	10.75
Cincinnati, del.	10.50
Cleveland, del.	11.05
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	16.00c
Toluol, two degree	25.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	6.75c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Birmingham, Ala.‡	19.38	.....	18.38	24.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	21.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	.....
St. Louis from Birmingham	†23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$22.50	Lake Superior fur.	$27.00
Pitts. dist. fur.	22.50	do., del. Chicago	30.34
		Lyles, Tenn.	26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$60.80

First Quality

Pa., Ill., Md., Mo., Ky.	47.50
Alabama, Georgia	47.50
New Jersey	52.50

Second Quality

Pa., Ill., Ky., Md., Mo.	42.75
Georgia, Alabama	34.20
New Jersey	49.00

Ohio

First quality	39.90
Intermediate	36.10
Second quality	31.35

Malleable Bung Brick

All bases	$56.05

Silica Brick

Pennsylvania	$47.50
Joliet, E. Chicago	55.10
Birmingham, Ala.	47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$28.00
Wire cut	$26.00

Magnesite

Domestic dead - burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$50.00
Chem. bonded chrome	50.00
Magnesite brick	72.00
Chem. bonded magnesite	61.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail.	22.00
Do, barge	22.00
No. 2 lump	22.00

Ferroalloy Prices

Ferromanganese, 78-82%, lump and bulk, carlots tide., duty pd. $100.00
Ton lots 110.00
Less ton lots 113.50
Less 200 lb. lots 118.00
Do., carlots del. Pitts. 105.33

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 32.00
Do., 26-28% 39.50

Ferrosilicon, 50% freight allowed, c.l. 69.50
Do., ton lot 82.00
Do., 75 per cent 126.00
Do. ton lots 142.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon, 103.00
2% carbon, 108.00; 1%, 118.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electrolytic, per ton, c. l., 23-26% f.o.b. Monsanto, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do, less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do, spot 145.00
Do, contract, ton lots 145.00
Do, spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do, spot 160.00
Do, contract, ton lots 160.00
Do, spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do, ton lots 8.00c
Do, less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do. spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ¼-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton $97.50
Do, spot 102.50

34-40%, contract, carloads, lb., alloy 14.00c
Do, ton lots 15.00c
Do, less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do, 100-200 lb. lots 2.75
Do, under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: SAE 2300	Cold Drawn Bars: SAE 3100
Boston	3.98	4.16	5.16	3.85	3.85	5.66	3.81	4.78	4.86	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	4.50	3.51	4.09	8.59	7.19
Philadelphia	3.85	3.85	4.35	3.55	3.55	5.25	3.55	4.55	4.75	3.51	4.06	8.56	7.16
Baltimore	3.95	4.05	4.45	3.70	3.70	5.25	3.55	....	5.05	....	4.05	....	....
Norfolk, Va.	4.15	4.25	....	3.90	3.90	5.45	3.75	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	6.40	4.20	4.40	4.25	3.42	3.75	8.15	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.75	3.35	3.65	8.15	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.72	3.20	3.75	8.15	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.50	4.84	3.40	3.80	8.45	7.05
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.67	3.45	4.00	8.50	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.35	4.30	4.60	3.50	3.75	8.15	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.60	4.95	5.00	3.83	4.34	8.84	7.44
Milwaukee	3.63	3.73	3.73	3.68	3.68	5.28	3.48	4.43	4.98	3.54	3.88	8.38	6.98
St. Louis	3.62	3.72	3.72	3.47	3.47	5.07	3.38	4.32	4.95	3.61	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.75	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.54	4.54	4.33	4.33	5.93	4.24	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	....	....	....	....
Seattle	4.00	3.85	5.20	3.40	3.50	5.75	3.70	6.50	4.75	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.65	6.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.65	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	SAE Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.35	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.10	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.30	5.85	5.85	7.70
Detroit	3.48	7.42	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.45	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	....	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.40	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds, except 0-1999 pounds (hot rolled sheets only) in New York; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, any quantity in New York, 150-1499 pounds in Cleveland, Milwaukee, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, St. Louis, Tulsa; 1500 and over in Chattanooga, Philadelphia; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, March 21

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports	£ s d	Quoted in dollars at current value	Continental North Sea ports, gross tons **Quoted in gold pounds sterling	£ s d
Foundry, 2.50-3.00 Si.	$22.44	6 0 0	$33.23		3 18 0
Basic bessemer	.....	.....	.....		.....
Hematite, Phos. .03-.05	23.38	6 5 0	.....		.....
Billets	.....	.....	$31.95		3 15 0
Wire rods, No. 5 gage	.....	.....	61.77		7 5 0
Standard rails	$39.27	10 10 0	$48.99		5 15 0
Merchant bars	2.25c	13 9 0	2.70c		7 2 0
Structural shapes	2.02c	12 2 6	2.85c		7 10 0
Plates, †¼ in. or 5 mm.	2.15c	12 17 6	3.19c		8 8 0
Sheets, black, 24 gage or 0.5 mm	2.84c	17 0 0	3.02c		7 19 0°
Sheets, gal., 24 ga., corr.	3.26c	19 10 0	4.29c		11 6 0
Bands and strips	.....	.....	2.71c		7 2 6
Plain wire, base	.....	.....	3.23c		8 10 0
Galvanized wire, base	.....	.....	3.90c		10 5 0
Wire nails, base	.....	.....	3.71c		9 15 0
Tin plate, box 108 lbs.	$ 6.08	1 12 6	.....		.....

British ferromanganese $100.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d		French Francs		Belgian Francs		Reichk §§Mar
Fdy. pig iron, Si. 2.5.	$20.75	5 11 0(a)	$16.62	788	$32.05	940	$25.33	63
Basic bess. pig iron	19.54	5 4 6(a)	.....	...	30.69	900	27.94 (b)	69.50
Furnace coke	5.92	1 11 8	4.75	225	10.57	310	7.64	19
Billets	35.06	9 7 6	24.54	1,163	43.48	1,275	38.79	96.50
Standard rails	1.86c	11 3 0	1.59c	1,588	2.06c	1,375	2.38c	132
Merchant bars	2.34c	14 0 0††	1.45c	1,454	2.06c	1,375	1.98c	110
Structural shapes	2.07c	12 8 0††	1.41c	1,414	2.06c	1,375	1.93c	107
Plates, †¼-in. or 5 mm.	2.09c	12 10 6††	1.85c	1,848	2.42c	1,610	2.29c	127
Sheets, black	2.92c	17 10 0§	2.19c	2,193‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	3.34c	20 0 0	2.85c	2,850	4.80c	3,200	6.66c	370
Plain wire	3.26c	19 10 0	2.34c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.46c	14 15 0††	1.63c	1,632	2.18c	1,450	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed. ††Rebate of 15s on certain conditions. N—Nominal.

**Gold pound sterling not quoted. §§Last prices, no current quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	15.00
Bos. dock No. 1 exp.	15.00
New Eng. del. No. 1	14.00
Buffalo, No. 1	16.50-17.00
Buffalo, No. 2	14.50-15.00
Chicago, No. 1	15.00-15.50
Chicago, auto. no alloy	14.00-14.50
Chicago, No. 2 auto	12.00-12.50
Cincinnati dealers	12.50-13.00
Cleveland, No. 1	16.00-16.50
Cleveland, No. 2	15.00-15.50
Detroit, No. 1	†12.50-13.00
Detroit, No. 2	†11.50-12.00
Eastern Pa., No. 1	17.00-17.50
Eastern Pa., No. 2	16.00
Federal, Ill.	13.50-14.00
Granite City, R. R	14.25-14.75
Granite City, No. 2	13.25-13.50
Los Ang., No. 1, net	11.50-12.00
Los Ang., No. 2, net	10.50-11.00
N. Y. dock No. 1 exp.	14.00
Pitts., No. 1 (R. R.)	18.00-18.50
Pittsburgh, No. 1	16.50-17.00
Pittsburgh, No. 2	15.00-15.50
St. Louis, R. R.	†13.75-14.25
St. Louis, No. 2	†13.00-13.50
San Fran., No. 1, net	11.50-12.00
San Fran., No. 2, net	10.50-11.00
Seattle, No. 1	14.50-15.50
Toronto, dirs., No. 1	11.00
Valleys, No. 1	16.50-17.00

COMPRESSED SHEETS

Buffalo, new	15.00-15.50
Chicago, factory	14.00-14.50
Chicago, dealers	13.00-13.50
Cincinnati, dealers	12.00-12.50
Cleveland	15.50-16.00
Detroit	†13.00-13.50
E. Pa., new mat.	17.00-17.50
E. Pa., old mat.	14.00-14.50
Los Angeles, net	9.00- 9.50
Pittsburgh	16.50-17.00
St. Louis	†11.00-11.50
San Francisco, net	9.00- 9.50
Valleys	16.00-16.50

BUNDLED SHEETS

Buffalo, No. 1	14.50-15.00
Buffalo, No. 2	13.00-13.50
Cleveland	11.50-12.00
Pittsburgh	15.50-16.00
St. Louis	†9.00- 9.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	10.00-10.50
Cincinnati, dealers	8.00- 8.50
Detroit	†9.00- 9.50
St. Louis	†8.50- 9.00
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1	13.00
Buffalo, No. 1	14.50-15.00
Chicago, No. 1	14.50-15.00
Cincin., No. 1, deal.	9.00- 9.50
Cincin., No. 2 deal.	3.00- 3.25
Cleveland, No. 2	9.50-10.00
Detroit, No. 1, new	†12.00-12.50
Valleys, new, No. 1	15.50-16.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	5.00
Buffalo	10.00-10.50
Chicago	9.25- 9.75
Cincinnati, dealers	5.00- 5.50
Cleveland, no alloy	8.50- 9.00
Detroit	†7.00- 7.50
Eastern Pa.	10.00-10.50
Los Angeles	4.00- 5.00
New York	†6.50- 7.00
Pittsburgh	10.25-10.75
St. Louis	†6.50- 7.00
San Francisco	5.00
Toronto, dealers	7.00- 7.25
Valleys	10.50-11.00

SHOVELING TURNINGS

Buffalo	12.50-13.00
Cleveland	9.50-10.00
Chicago	9.50-10.00
Chicago, spcl, anal.	12.50-13.00
Detroit	†7.50- 8.00
Pitts., alloy-free	12.00-12.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	†4.00
Buffalo	10.00-10.50
Cincinnati, dealers	3.75- 4.25
Cleveland	9.50-10.00
Eastern Pa.	9.50
Detroit	†7.25- 7.75
New York	†5.75- 6.00
Pittsburgh	9.00- 9.50
Toronto, dealers	6.75

AXLE TURNINGS

Buffalo	16.50-17.00
Boston district	†9.50-10.00
Chicago, elec. fur.	16.00-16.50
East. Pa. elec. fur.	16.50-17.00
St. Louis	†10.00-10.50
Toronto	6.00- 6.50

CAST IRON BORINGS

Birmingham	7.50
Boston dist. chem.	†7.75- 8.00
Buffalo	10.00-10.50
Chicago	9.25- 9.75
Cincinnati, dealers	3.75- 4.25
Cleveland	9.50-10.00
Detroit	†7.25- 7.75
E. Pa., chemical	14.50-15.00
New York	†7.00
St. Louis	†5.00- 5.50
Toronto, dealers	6.75

RAILROAD SPECIALTIES

Chicago	18.25-18.75

ANGLE BARS—STEEL

Chicago	18.00-18.50
St. Louis	†14.75-15.25

SPRINGS

Buffalo	19.50-20.00
Chicago, coil	18.50-19.00
Chicago, leaf	17.50-18.00
Eastern Pa.	20.50-21.00
Pittsburgh	20.50-21.00
St. Louis	†16.50-17.00

STEEL RAILS, SHORT

Birmingham	16.50
Buffalo	21.50-22.00
Chicago (3 ft.)	18.50-19.00
Chicago (2 ft.)	19.00-19.50
Cincinnati, dealers	19.00-19.50
Detroit	†19.50-20.00
Pitts., 3 ft. and less	20.50-21.00
St. Louis, 2 ft.& less	†18.00-18.50

STEEL RAILS, SCRAP

Birmingham	16.00
Boston district	†14.00-14.50
Buffalo	17.00-17.50
Chicago	16.00-16.50
Cleveland	18.50-19.00
Pittsburgh	18.50-19.00
St. Louis	†15.25-15.75
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	10.00-10.50
Cincinnati, dealers	9.75-10.25

RAILROAD GRATE BARS

Buffalo	11.50-12.00
Chicago, net	10.00-10.50
Cincinnati, dealers	8.50- 9.00
Eastern Pa.	15.00-15.50
New York	†10.50-11.00
St. Louis	†9.50-10.00

RAILROAD WROUGHT

Birmingham	14.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	18.00-18.50
St. Louis, No. 1	†10.50-11.00
St. Louis, No. 2	†13.25-13.75

FORGE FLASHINGS

Boston district	†10.00
Buffalo	14.50-15.00
Cleveland	15.00-15.50
Detroit	†11.50-12.00
Pittsburgh	15.50-16.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	18.00-18.50

LOW PHOSPHORUS

Cleveland, crops	21.50-22.00
Eastern Pa. crops	20.50-21.00
Pitts., billet, bloom, slab crops	21.50-22.00

LOW PHOS. PUNCHINGS

Buffalo	19.50-20.00
Chicago	17.50-18.00
Cleveland	17.50-18.00
Eastern Pa.	21.00-21.50
Pittsburgh	20.00-20.50
Seattle	15.00
Detroit	†13.25-13.75

RAILS FOR ROLLING

3 feet and over

Birmingham	16.50
Boston	†15.75-16.00
Chicago	18.00-18.50
New York	15.50-16.00
Eastern Pa.	20.00-20.50
St. Louis	†17.00-17.50

STEEL CAR AXLES

Birmingham	18.00
Boston district	†16.00-16.50
Chicago, net	20.50-21.00
Eastern Pa.	22.00
St. Louis	†18.00-18.50

LOCOMOTIVE TIRES

Chicago (cut)	18.00-18.50
St. Louis, No. 1	†15.25-15.75

SHAFTING

Boston district	†17.00
New York	†18.00-18.50
Eastern Pa.	23.00-23.50
St. Louis, 1¼-3¾"	†16.50-17.00

CAR WHEELS

Birmingham, iron	13.00
Boston dist., iron	†13.00-13.25
Buffalo, steel	21.00-21.50
Chicago, iron	17.00-17.50
Chicago, rolled steel	17.50-18.00
Cincin., iron, deal.	16.50-17.00
Eastern Pa., iron	20.00-20.50
Eastern Pa., steel	20.50-21.00
Pittsburgh, iron	18.50-19.00
Pittsburgh, steel	20.50-21.00
St. Louis, iron	†15.50-16.00
St. Louis, steel	†16.50-17.00

NO. 1 CAST SCRAP

Birmingham	16.00
Boston, No. 1 mach.	†14.50
N. Eng. del. No. 2	14.00-14.50
N. Eng. del. textile	17.75-18.25
Buffalo, cupola	16.50-17.00
Buffalo, mach.	17.50-18.00
Chicago, agri. net	12.50-13.00
Chicago, auto net	14.50-15.00
Chicago, railroad net	14.00-14.50
Chicago, mach. net	14.50-15.00
Cincin., mach. deal.	16.00-16.50
Cleveland, mach.	20.00-21.00
Detroit, cupola, net	†14.50-15.00
Eastern Pa., cupola	19.50-20.00
E. Pa., No. 2 yard	16.50
E. Pa., yard fdry.	16.50-17.00
Los Angeles	16.50-17.00
Pittsburgh, cupola	17.50-18.00
San Francisco	14.50-15.00
Seattle	16.00-16.50
St. Louis, breakable	†14.00-14.50
St. Louis, agri. mach.	†16.50-17.00
St. L., No. 1 mach.	†17.00-17.50
Toronto, No. 1, mach., net dealers	16.50

HEAVY CAST

Boston dist. break.	†12.75-13.25
New England, del.	15.00-15.50
Buffalo, break	14.50-15.00
Cleveland, break, net	15.25-15.75
Detroit, auto net	†15.50-16.00
Detroit, break	†11.00-11.50
Eastern Pa.	18.50
Los Ang., auto, net	13.00-14.00
New York break	†13.50-14.00
Pittsburgh, break	15.00-15.50

STOVE PLATE

Birmingham	10.00
Boston district	†10.50-11.00
Buffalo	13.50-14.00
Chicago, net	8.50- 9.00
Cincinnati, dealers	8.25- 8.75
Detroit, net	†9.00- 9.50
Eastern Pa.	15.00-15.50
New York fdry.	10.00
St. Louis	†11.00-11.25
Toronto dealers, net	12.00

MALLEABLE

New England, del.	21.00
Buffalo	16.50-17.00
Chicago, R. R.	18.50-19.00
Cincin., agri., deal.	13.25-13.75
Cleveland, rail	20.50-21.00
Eastern Pa., R.R.	21.00-21.50
Los Angeles	12.50
Pittsburgh, rail	21.00-21.50
St. Louis, R.R.	†16.25-16.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ %
Lower Lake Ports

Old range bessemer	$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 36-63%, contract	9.00-10.00

Foreign Ore
(Prices nominal)

Cents per unit. c.i.f. Atlantic ports

Manganiferous ore, 45-35% Fe., 6-10% Mn.	14.00-15.00
Swedish low phos.	14.00
North African low phos.	14.00
Spanish, No. African basic, 50 to 60%	14.00
Chinese wolframite, short ton unit, duty paid	$23.00-23.50
Scheelite, imp.	$23.50-24.50
Chrome ore, Indian, 48% gross ton, cif.	$26.00-28.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	48.00-50.00
So. African, 50-52%	48.00-50.00
Indian, 49-50%	nom.
Brazilian, 48-52%	46.00-48.00
Cuban, 50-51%, duty free	61.20

Molybdenum

Sulphide conc., per lb., Mo. cont., mines	$0.75

—The Market Week—

Sheets, Strip

Sheet & Strip Prices, Page 82, 83

Pittsburgh—Sheet and strip buying is better diversified, but gains in total tonnage have been small and so far have been unable to reverse the recent downward trend in production. Mill operations are tending to level off, however, latest reductions having been slight. Sheet mill schedules, including galvanized, are about 50 per cent, with strip output around 40. Galvanized demand still is retarded but is expected to respond to more open weather. Automotive sheet buying is mostly in small lots and for a number of weeks has been comparatively less active than would be expected from the high assembly rate.

Cleveland—Small lot buying continues in steel sheets, from diversified sources. Automotive needs constitute a sustaining factor in this market. Household equipment manufacturers are taking satisfactory tonnages. Sheet backlogs are being reduced steadily and occasional orders for immediate delivery indicate exhaustion of inventories.

Chicago—Order volume is appreciably unchanged, but is holding steadily at a rather low level generally. Flat-rolled needs of farm implement makers remain high, though expected to taper. Automotive business continues a major factor, with prospect of improvement soon. Household appliance manufacturers are in line to replenish decreasing inventories, some mills feel. Sheet production holds at recent levels.

Boston—Fill-in orders for narrow cold strip are more numerous. Most orders are for immediate delivery with consumers still operating on inventories for a substantial part of current needs. Incoming volume is approximately 55-60 per cent of capacity, but with backlogs lowered by heavy shipments and limited buying, reductions in finishing operations continue.

New York—Some leading mill representatives here doubt if there will be an important gain in sheet business here before the middle of second quarter. Others believe that improvement will come earlier. Meanwhile, sheet specifications are being sustained and, in general, fabrication in this district is proceeding at a faster rate than sheets are being specified. This means a reduction in consumer stocks.

Narrow cold strip orders for prompt delivery are more numerous, but aggregate tonnage reaching mills has gained little. Incoming volume is estimated at 55 per cent of capacity. Backlogs are on the

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a specialty with "Standard"

Cast steel runner for an I. P. Morris hydraulic turbine. Weight of casting about 45,000 pounds.

Cast steel housing for this Southwark forging press was produced by Standard Steel Works Company. Weight of casting about 129,000 pounds.

● Standard is equipped to supply steel castings of any size and shape to suit your requirements. The steel used is acid open hearth, produced in Standard's furnaces under close metallurgical control of a trained personnel. Standard's long experience is reflected in the high quality of its products.

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STANDARD STEEL WORKS CO.

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Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

decline and scattered curtailments in production schedules continue. Shipments this month are running slightly under those of February.

Philadelphia—Sheet specifications are a shade better on increased automotive activity and seasonal requirements of roofing manufacturers and the sheet metal trade. Private building work is noticeably improved. Delivery on hot-rolled sheets is available in a week or less.

Buffalo—Bookings of sheet and strip steel show mild improvement. Tonnage, however, is restricted in volume and buying is barely able to hold rolling schedules around 65 per cent. Some pickup in automotive demand is expected to spur production soon. Mills consider the increased number of inquiries, even though tonnage is light, as indicative of low inventories in the hands of consumers.

Cincinnati—Only slight change is noted in sheet demand. Some consumers are reducing inventories built on orders placed last quarter. Some other users seek rush shipments. District mills expect better weather to bring out heavier specifications for galvanized, so far unseasonally dull.

St. Louis—The last week has seen a considerable increase in sales of galvanized sheets, especially to jobbers in the southern states served by St. Louis factors. The open weather has given farmers opportunity to use material for roofing and other repairs and jobbers in turn are buying in carload lots.

Birmingham, Ala.—Because of continued rain and cold sheet demand has failed to materialize in appreciable volume, although production remains near the 80 per cent mark because of business brought over from last quarter. A small volume of cotton ties is being turned out.

Toronto, Ont.—Despite the fact that producers are booked almost solid to the end of June sheet demand continues heavy and inquiries are increasing. Consumers in need of spot shipment are turning to warehouses, obtaining small lots, or seeking supplies in the United States. Electric stove and refrigerator makers are more active and automobile builders have bought more freely. Second quarter sheet prices have not been announced.

Tin Plate

Tin Plate Prices, Page 82

Tin plate producers are optimistic regarding the outlook, despite slowness with which specifications have been received lately. Effects of last fall's over-buying steadily are being dissipated, and current and prospective requirements of container manufacturers point to an upturn in releases and production in April. Meanwhile specifications hold around recent levels, with tin mill operations unchanged at 53 per cent.

Plates

Plate Prices, Page 82

Pittsburgh—Plate demand is spotty, relatively the best outlet here being barge building. Business in river craft so far this year has been close to record volume for this period. Barge builders' backlogs will support heavy operations until mid-summer and prospects for additional contracts are favorable. Municipal tank work is extremely dull, with both inquiries and awards few. Plate requirements for structural fabrication are moderate, while little change has occurred in buying for oil company use.

Cleveland—Plate buying continues steady and without feature. Delivery usually is about two to three weeks. Freight car construction and shipbuilding requirements, a factor in other areas, is felt little by Cleveland mills.

Chicago—Support from makers of heavy machinery is substantial. More freight car business is seen in the future if present pending cars are awarded. Tanks and bridgework are fairly prominent but shipbuilding is a minor factor in this district Substantial plate tonnage has been reported sold at published quotation of 2.10, although average price generally is believed lower.

Boston—Small-lot buying leads in plate demand with prompt delivery a factor in the limited volume being placed. Shipments to shipyards, private and navy, are slightly heavier. Miscellaneous fabricating shops are buying close to requirements but replacement orders from jobbers are light. Requirements of the building industry tend upward without any large individual tonnages. Floor plates move slowly.

New York—With plate demand dull, sellers doubt if March business will show any gain over February. Present dullness is particularly accentuated by a drop in foreign demand. Domestic plate prices, fairly steady, are subject to occasional waiving of extras.

Philadelphia—Sun Shipbuilding Corp. is low on two to six 16½-knot national defense oil tankers and Bethlehem Steel Co. is low on the same number of 13½-knot tankers. It is reported in the trade three vessels will be placed with each builder. The former has considerable tonnage of steel to place against vessels already booked. Miscellaneous demand is slow. Additional plate inquiry is reported from Norway, Italy, Canada and South America, but prices have weakened further.

Birmingham, Ala.—Demand for plates continues reasonably active, but mostly in small lots. Some 1939 tonnage remains to be worked off. Some railroad business is in sight, which probably will steady production for a part at least of second quarter.

Seattle—Plate fabricators expect some important tonnages for government projects are to be released soon. Union Oil Co. is increasing storage facilities at Alaska terminal points and has awarded a contract to Seattle Boiler Works to construct several large tanks requiring 400 tons of plates. Shell Oil Co. plans additional storage at Seattle. No announcement has been released regarding awards for several large storage tanks for Richfield Oil Co.'s Seattle terminals.

San Francisco—The outlook in the plate market is encouraging and a heavy tonnage is expected to be placed in southern California before the end of the year, involving more than 20,000 tons. The only large letting went to Western Pipe & Steel Co., and called for 488 tons for a 24-inch welded steel pipe line for the Sierra Light & Power Co., Reno, Nev. Awards so far this year aggregate 15,780 tons, compared with 14,799 tons for the corresponding period in 1939.

Toronto, Ont.—Shipbuilders and other users of plates report better deliveries, largely due to increased tonnages from the United States. Plant additions underway in Ontario will increase production and augment output for the latter part of next quarter. Demand is brisk and Canadian output has been booked for months ahead. It is stated that as the shipbuilding program gets well underway larger tonnages will be required from the United States.

Plate Contracts Placed

2100 tons, tanks, Wood River, Ill., to Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

2000 tons, also 1400 tons of shapes, ten river barges for Campbell Transportation Co., Pittsburgh; seven to Dravo Corp., Pittsburgh, three to American Bridge Co., Pittsburgh.

1300 tons, including 500 tons of shapes, eight all-welded river barges, Island Creek Coal Co., Huntington, W. Va., to Bethlehem Steel Co., Bethlehem, Pa.

488 tons, 24-inch welded steel pipe, Sierra Light & Power Co., Reno, Nev., to Western Pipe & Steel Co., San Francisco.

400 tons, storage tanks for delivery in

Alaska for Union Oil Co., to Seattle Boiler Works.

110 tons, 32-inch steel pontoon pipe, United States engineer, Memphis, Tenn., to Virginia Bridge Co., Roanoke, Va.

Plate Contracts Pending

3000 tons, mostly plates, twenty 100-foot harbor tugs, schedule 1170, bureau of supplies and accounts, Washington; bids April 26.

2100 tons, 8-foot 6-inch to 10-foot 3-inch welded steel pipe; replacement work on Los Angeles aqueduct, Los Angeles, specification 3315; bids opened.

1000 tons, four 22-foot diameter penstocks, power plant, Parker Dam project near Earp, Calif.; bids April 15.

822 tons, conduit, 86-inch x 5/16-inch welded steel pipe, Leevining Creek to Grant Lake Reservoir, water and power department, Los Angeles, specification 3374; bids April 2.

500 tons, elevated water tank, Toledo, O.; Pittsburgh-Des Moines Steel Co., Pittsburgh, low.

100 tons or more, 250,000-gallon standpipe, Harvard, Mass.

Bars

Bar Prices, Page 82

Pittsburgh—Demand is improving gradually, aided both by export business and by the reappearance in the market of some buyers for the first time in several months. The latter situation reflects inventory curtailment. Automotive specifications are spotty but relatively heavy in the aggregate. Export inquiries are increasing, particularly for special alloys required in building aircraft and other military equipment. Demand from domestic machine tool interests continues brisk.

Chicago—Sales are improved in several instances but general volume remains about the same. Alloy bar demand is somewhat better, following a leveling off period. Automotive needs are substantially unchanged but larger buying is in prospect. Farm implement needs still are high but tapering. Forgers have lighter orders and backlogs for six to eight weeks.

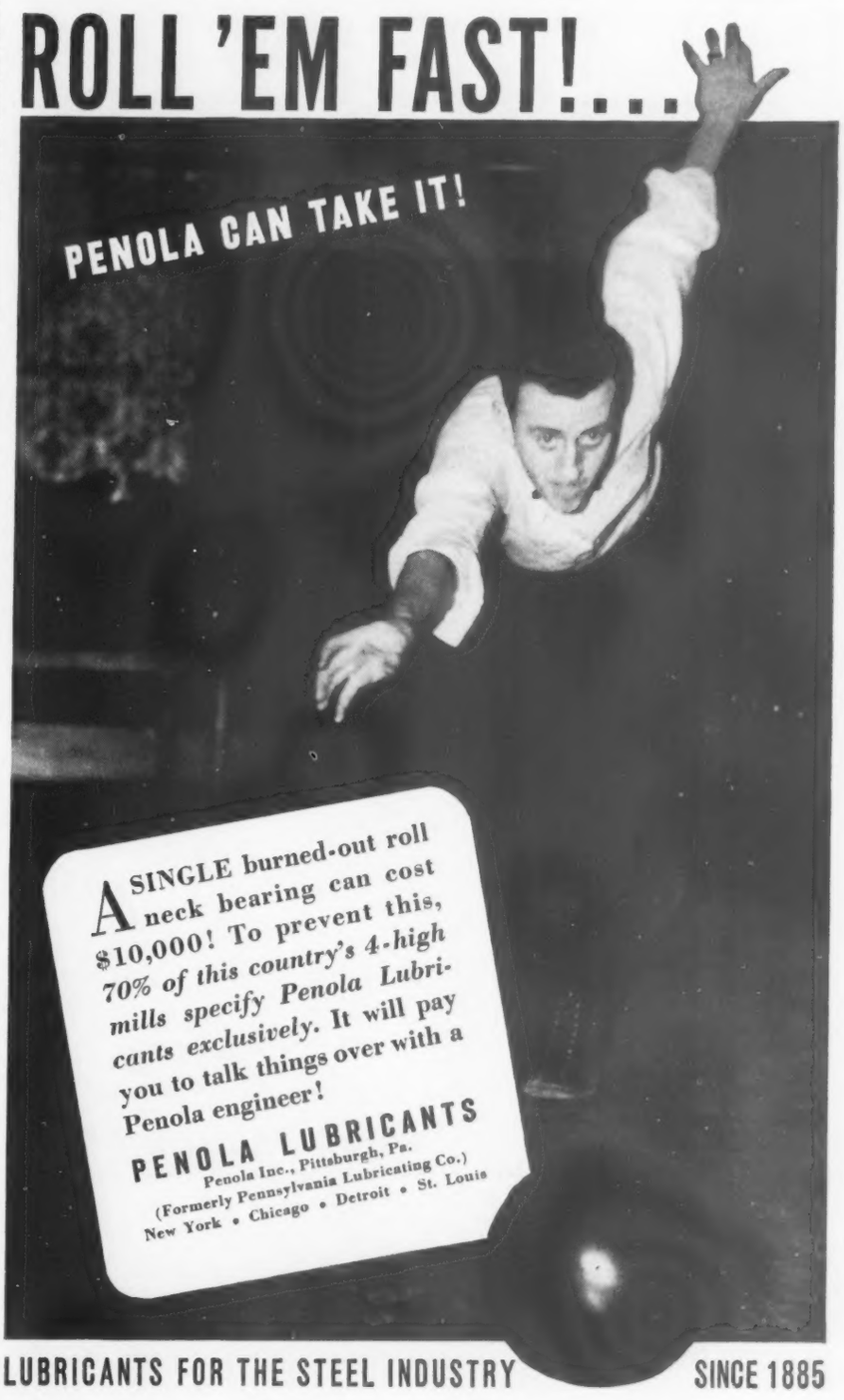
Boston—Further improvement in commercial steel bar buying is slight, notably in carbon steel stock. Demand for alloy and heat-treated bars is well maintained with deliveries somewhat improved, although electric furnace material is still subject to delay despite expanding production facilities. Machine tool, aircraft, shipyard and chainmaking shops are leading consumers. Small diameters make up most volume. Railroad releases are limited and spotty.

New York—Steel bar specifications are steady, having shown little variation so far this month. Principal releases are from machine tool builders and manufacturers of airplane engines, although a steady flow of specifications continues from shipyards and government shops. Shipments on hot and cold-rolled carbon bars average two to three weeks; on alloy bars, five to eight weeks and on heat treated bars, three months or more in most cases.

Philadelphia—Demand for alloy bars is fairly well maintained, especially for specialized purposes, such as aircraft and small tools. Carbon bars are quiet. Warehouses are placing orders only when necessary to round out stocks. Prices are steady.

Birmingham, Ala.—While change in bar demand is small, the trend is upward. Considerable tonnage is moving to manufacturers of agricultural implements, and some business is available from miscellaneous sources, mostly in small lots.

Buffalo—Bar demand continues at a fairly satisfactory rate, most buying being by miscellaneous users, with indications for a spring increase. Backlogs have been considerably reduced.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Pipe

Pipe Prices, Page 83

Pittsburgh—Standard pipe demand has quickened with improvement in the weather. Recovery in shipments to the South, where business was curtailed sharply by the unusually severe winter, has been particularly marked this month. Activity in oil country goods is only fair and is about on a par with a year ago. Line pipe business is comparatively good, considering it is made up of small lots. Pressure tubing demand is improved slightly, with mechanical tubing rather slow.

Philadelphia—Some improvement in line pipe pending is indicated by inquiries for deliveries several weeks hence. New well drilling in the Southwest is scheduled for an increase of about 10 per cent over 1939. Merchant pipe is slow but improvement in private building, including housing projects, has brightened the outlook.

Birmingham, Ala.—While the outlook for second quarter is considered reasonably good, some disappointment is expressed over production for March. Most tonnage is for small sizes. Inquiries are fairly active.

Seattle—Cast iron pipe is moving in fair volume, calls for small lots increasing during the month. No large tonnages, except 300 tons of 4 to 8-inch for Cle Elum, Wash., bids March 27, are pending. H. G. Purcell, Seattle, took an additional 100 tons of 4 to 8-inch for Leavenworth, Wash., making the total 300 tons.

San Francisco—Improvement in demand for cast iron pipe is noted and several fair sized tonnages are up for figures. Awards totaled 638 tons and brought the year's aggregate to 7021 tons, compared with 6641 tons for the same period a year ago. American Cast Iron Pipe Co. took 100 tons of 8-inch pipe for Pomona, Calif.

Steel Pipe Placed

Unstated tonnage, 125 seventeen-foot sections, 20-inch i.d. steel shore pipe, United States engineer, Vicksburg, Miss., to Columbian Steel Tank Co., Kansas City, Mo.; awarded March 12.

Unstated tonnage, 3250 galvanized steel header sections, United States engineer, second district, New Orleans, to American Sheet Metal Works, New Orleans, $8,240, pro. 324.

Steel Pipe Pending

1000 miles, 10-inch line pipe, Kansas Pipe Line & Gas Co., Manhattan, Kans., for proposed gas line between Texas Panhandle and northern Minnesota.

Cast Pipe Placed

100 tons, 8-inch, Pomona, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.

100 tons, 6-inch, Panama Canal, C. Z., to unnamed interest.

Cast Pipe Pending

670 tons, 6 to 12-inch, Pasadena, Calif.; bids March 27.

400 tons, cast iron or cement asbestos, Ontario, Oreg.; bids March 28.

278 tons, 6 to 12-inch, Long Beach Calif.; bids March 26.

143 tons, 6 to 14-inch, Sacramento, Calif.; bids opened.

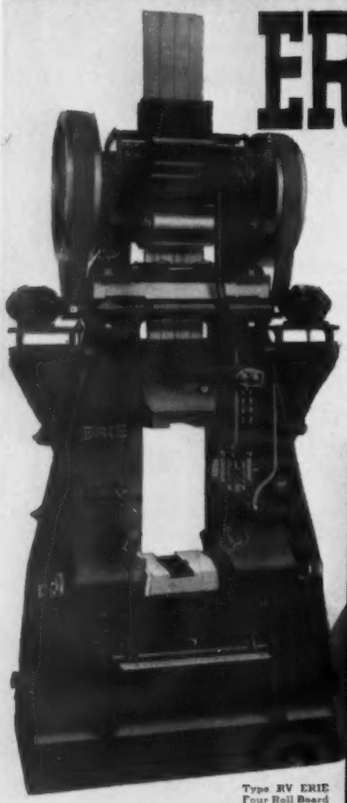
Rails, Cars

Track Material Prices, Page 83

Despite the relatively small pending business in railroad equipment, steel producers see possibilities of a large freight car buying in coming months. Barring an unexpected turn for the worse in general business and freight traffic, there are good prospects for placing 50,000 or more freight cars this year, some sellers believe. Building of cars placed last quarter is well advanced,

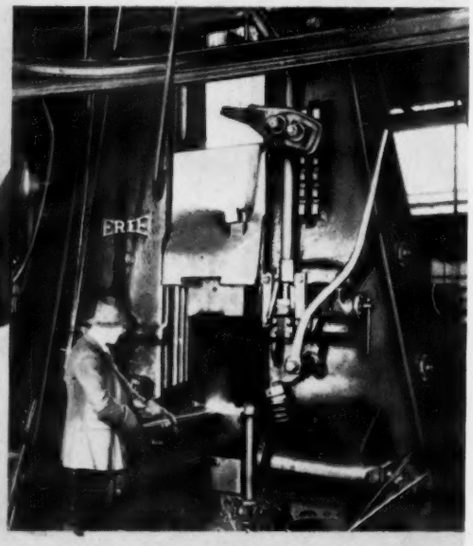
ERIE BOARD DROP HAMMERS

ERIE Board Drop Hammers combine improvements in design and construction made over Erie's 40 years of experience . . . Rugged strength and reliability result in low cost operation. These Erie Board Drop Hammers are available in ratings of 400 lbs. to 10,000 lbs. . . . Write for Bulletin No. 328 giving full data.



Type RV ERIE Four Roll Board Drop Hammer.

An Erie 4 roll hammer turning out quality forgings in a large Eastern Forge Shop.



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with little steel remaining to be delivered for this equipment. Consequently, what additional car buying programs are under consideration would be expected to start to materialize within the next 30 to 60 days.

Car Orders Placed

Illinois Central, 62 covered hopper-bottom cars, 70 tons capacity, to General American Transportation Corp., Chicago.

Jones & Laughlin Steel Corp., 250 mine cars and 200 mine car bodies, distributed among several builders.

Navy, one tank car, to General American Transportation Co., Chicago.

Car Orders Pending

Alaskan Railway (department of interior), twenty 55-ton all-steel twin hopper cars, four 40-ton steel underframe refrigerator cars, two 60-foot steel baggage cars and two 70-foot steel coaches; bids April 1 at Seattle, Wash.

Chesapeake & Ohio, 100 fifty-foot, 50-ton flat cars; bids April 10.

Chicago, Burlington & Quincy, 100 covered hoppers.

North Western Refrigerator Line, 200 refrigerator cars.

Locomotives Pending

Tennessee Central, one to five locomotive tenders.

United Fruit Co., New York, four 2-8-2 locomotives for Central America; bids asked.

Buses Booked

American Car & Foundry Motors Co., New York: Eight 37-passenger for Santa Fe Transportation Co., Wichita, Kans.; eleven 27-passenger for Lafayette Street Railway Inc., Lafayette, Ind.; ten 36-passenger for Houston Electric Co., Houston, Tex.; five 32-passenger for Middlesex & Boston Street Railway Co., Newtonville, Mass.; Two 36-passenger for Saugus Transit Co., Saugus, Mass.

Twin Coach Co., Kent, O.; Thirty-four 41-passenger for Kansas City Public Service Co., Kansas City, Mo.; ten 41-passenger for Capital Transit Co., Washington; ten 35-passenger for Youngstown Municipal Railway Co., Youngstown, O.; six 27-passenger for Tri-City Railway Co. of Iowa, Davenport, Iowa; five 41-passenger for Seattle Transit System, Seattle; three 31-passenger for Pacific Electric Railway Co., Los Angeles.

Buses Pending

Philadelphia Transportation Corp., 48 trolley coaches, bids April 1; in addition to 50 to 130 trolley cars noted in a recent issue as up for bids March 29

Wire

Wire Prices, Page 83

Pittsburgh—Merchant wire products are slow to respond to the season, still being affected in some sections by unfavorable weather. Manufacturers' wire and wire rod demand is barely steady, and recovery in buying from the slump earlier this quarter apparently will be deferred until April, when further reduction in consumer inventories will be a supporting factor.

Cleveland—Advancing season has had some effect on demand for merchant wire but spring buying still lags. Automotive needs furnish a fair total. Manufacturers' wire is slightly more active as contracts on mill books are worked down.

Chicago—Buying has yet to show marked upturn. Fluctuations are noted from time to time in order volume but uptrend is not definitely established yet. Industrial needs generally hold well, but increased automotive accessory material demand is awaited. Farm implement production continues to require encouraging amounts.

New York—Improvement in wire buying is spotty with incoming volume estimated at 50-55 per cent of capacity. Releases continue largely for fill-in tonnage. Rope and heavier goods are well maintained

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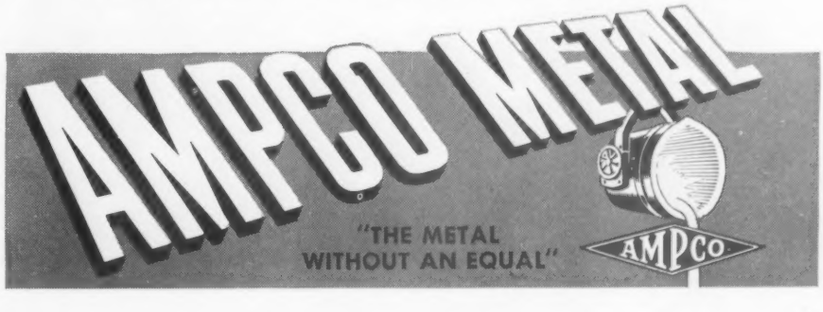


and government purchases are substantial, including various types of cable. Except for a few specialties, backlogs with mills have been practically eliminated.

Boston—Usual seasonal improvement in merchant wire products has been backward. While there is some spotty improvement in buying of manufacturers' wire and specialties, incoming volume is still mostly for fill-in needs. Most orders are for prompt delivery.

Birmingham, Ala.—Wire products continue consistently active. Production is about 85 per cent.

Shapes

Structural Shape Prices, Page 82

Chicago—Order volume continues unchanged. Some increase in private construction is indicated, but public works are unimproved. American Bridge Co. has booked 1200 tons for a new Sears, Roebuck & Co. warehouse, Chicago.

Boston—Two government projects taking 10,800 tons are outstanding, 3300 tons being placed for a navy yard shop building, and 7500 tons for a water front development, Boston, will be bought this week by Merritt-Chapman & Scott Co., New York. The latter involves mostly piling and reinforcing steel. Inquiry in other directions is slightly heavier, but below normal for this period.

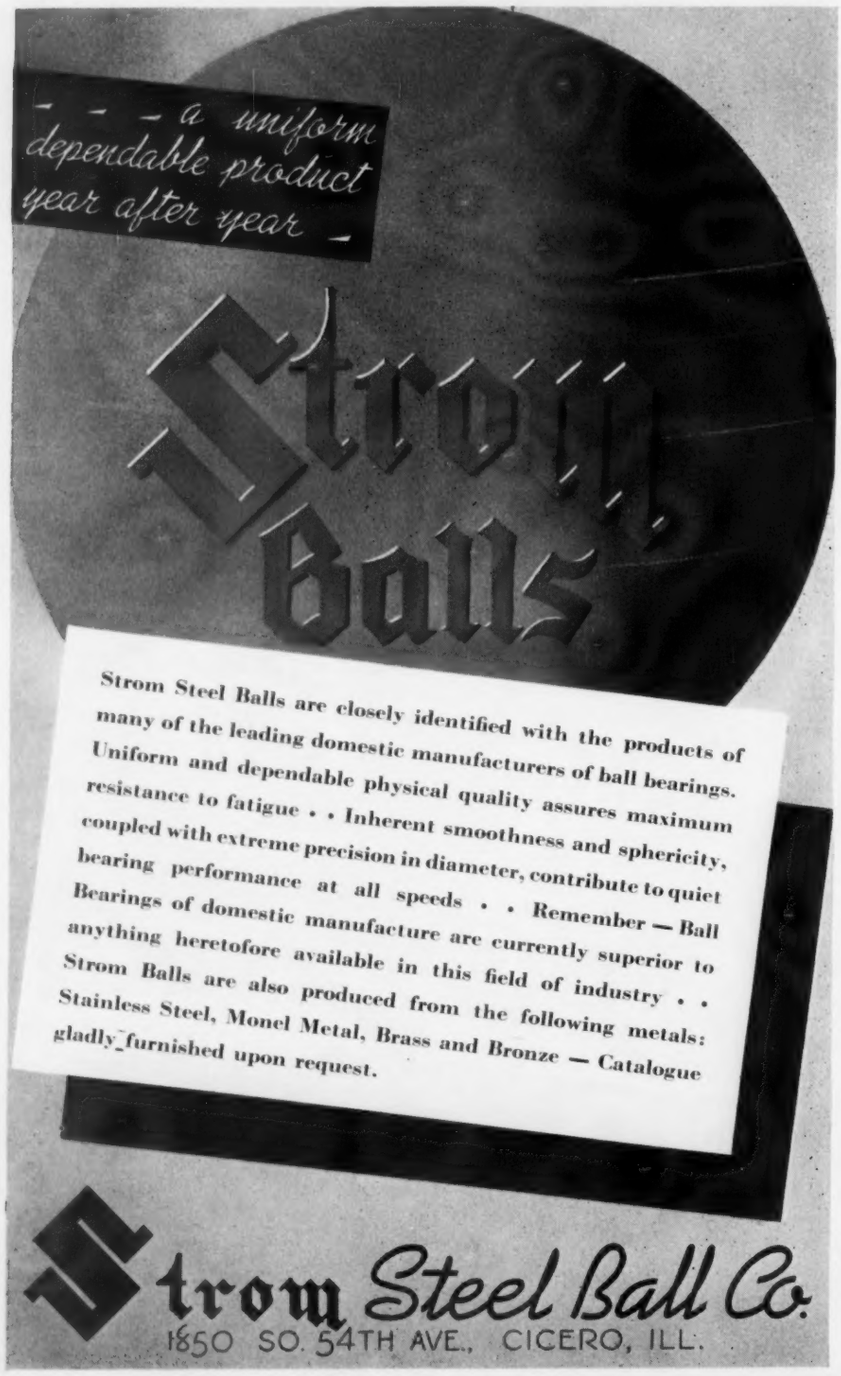
Pittsburgh — Fabricated shape business is spotty. Best activity is in small industrial buildings and extensions, which are fairly numerous, and major government projects, competition for which is keen. Inquiries tend to improve and expansion in pending tonnage points to a better volume of orders the next 60 days. Federal jobs dominate recent inquiries.

New York — Structural steel inquiry is heavier, with bids in on close to 3000 tons for upstate bridge and grade crossing projects. Outlook for this type of construction is substantially enhanced by several large jobs in the metropolitan area. More medium-sized industrial expansions are also appearing. Led by 2500 tons for a school, Brooklyn, awards are not numerous.

Philadelphia — General contract bids will be taken April 23 for a large medical center at Bethesda, Md., which subsequently will release considerable tonnage of structurals already placed on direct jobs. Reinforcing bars will also be required. Public work is slow here but several private projects are pending.

Buffalo—Bethlehem Steel Co. submitted the low bid on the superstructure of the 7000-ton Rainbow bridge, Niagara Falls. Bids must be approved by the bridge commission, but contracts are expected to be awarded within 30 days. If the commission decides on concrete approaches instead of steel the structural award will be reduced to 5500 tons and the reinforcing award raised to 1050 tons from 460 tons.

Seattle—Shops are fairly busy but no important projects are out and practically all pending business has been awarded. Additional fabricating contracts for the navy air bases in Alaska are to be placed soon. Tonnages have not been announced.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Shape Awards Compared

	Tons
Week ended March 23	16,768
Week ended March 16	14,252
Week ended March 9	13,210
This week, 1939	15,840
Weekly average, year, 1940	19,416
Weekly average, 1939	22,411
Weekly average, February	31,399
Total to date, 1939	272,753
Total to date, 1940	232,995

Includes awards of 100 tons or more.

Bids are called at Denver March 28 for steel framing for the Leavenworth, Wash., cold storage plant, quantity unstated. Bids are in for an overhead bridge crane for the Wapato project, Yakima, Wash., Indian reservation. Idaho state plans construction of a $110,000 bridge at Kamiah as soon as federal aid is assured.

Toronto, Ont.—Demand for structural shapes is increasing and fabricators report improvement in business over a year ago, largely due to increased building on war account. Prospective orders include 500 tons for addition to plant at Toronto for Dunlop Tire & Rubber Co.

Shape Contracts Placed

3300 tons, shop building 16-DD- navy yard, Boston, to American Bridge Co., Hughes-Folkrod Co., Philadelphia, general contractor.

2500 tons, Fort Hamilton high school, Brooklyn, to American Bridge Co., Pittsburgh.

1400 tons, also 2000 tons plates, ten river barges for Campbell Transportation Co., Pittsburgh; seven to Dravo Corp., Pittsburgh, three to American Bridge Co., Pittsburgh.

1200 tons, warehouse, Sears, Roebuck & Co., Chicago, to American Bridge Co., Chicago.

1050 tons, tunnel ribs, including plates, Conchas dam, New Mexico, to Colorado Fuel & Iron Corp., Denver.

800 tons, piling, Cuyahoga river straightening, Cleveland, contract No. 25, to Carnegie-Illinois Steel Corp., Pittsburgh; Merritt-Chapman & Scott contractors.

675 tons, cell plates, prison building, New York, for city, to Bethlehem Steel Co., Bethlehem, Pa.

655 tons, bottling building, J. K. Seagram & Sons Co., Louisville, Ky., to Snead Architectural Iron Works, Louisville.

640 tons, factory building, Kimberly-Clark Corp., Neenah, Wis., to Wisconsin Bridge & Iron Co., Milwaukee.

528 tons, switch supports for Bonneville dam, Oreg., Invitation 769, to Lehigh Structural Steel Co., Allentown, Pa.

500 tons, gymnasium, University of New Brunswick, Fredericton, N. B., to St. John Dry Dock Co., St. John, N. B.

490 tons, hangar doors, spec. 9543, delivery various air stations, navy department, to Byrne Doors Inc., New York.

325 tons, power house, Tri-State Power Co-operative, Genoa, Wis., to L. G. Arnold Inc., Eau Claire, Wis.

300 tons, department store, Kitchener, Ont., to Frankel Bros., Toronto, Ont.

300 tons, building for Vancouver Exhibition association, Vancouver, B. C., to Dominion Bridge Ltd., Vancouver, B. C.

300 tons, repairs to bridges 54 and 56, Highland Falls, N. Y., New York Central railroad, to American Bridge Co., Pittsburgh.

255 tons, forty-ninth street bridge, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa., through H. R. Dickens, Philadelphia; includes 53 tons bars.

255 tons, state highway bridge, route 35055, Old Forge, Pa., to American Bridge Co., Pittsburgh.

255 tons, bridge 56-FAS-29B (1), Lyon county, Kansas, to Missouri Valley Bridge & Iron Co., Leavenworth, Kans.

200 tons, warehouse, Pacific Portland Cement Co., Redwood City, Calif., to Moore Drydock Co., Oakland, Calif.

200 tons, garage, Coca Cola Bottling Co., Detroit, to Whitehead & Kales Co., Detroit.

200 tons, segmental valves, etc., Kentucky dam, Gravel Switch, Ky., for T.V.A., to Worden-Allen Co., Milwaukee.

180 tons, building for Allis-Chalmers Mfg. Co., Emeryville, Calif., to Moore Drydock Co., Oakland, Calif.

155 tons, Moore Park bridge, Los Angeles, to Minneapolis-Moline Power Implement Co., Minneapolis.

150 tons, store, Hamilton, Ont., to Hamilton Bridge Co., Hamilton, Ont.

150 tons, for office building for Yale & Towne Mfg. Co., St. Catharines, Ont., to Standard Steel Construction Co., Port Robinson, Ont.

150 tons, garage, Brooklyn, to Bethlehem Fabricators Inc., Bethlehem, Pa., through procurement division, treasury department, New York.

145 tons, highway bridge, Muskingum, Okla., to Fort Pitt Bridge Works, Pittsburgh.

135 tons, power house conveyor, Burlington, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

WHAT'S THE IDEA?

Many improvements fail to materialize — many new products fall short of their profit possibilities because somewhere along the line a special shape or shell is not as practical or as economical as it should be.

Hackney engineering and manufacturing facilities have created many special shapes and shells

New three-part container for dispensing grease

FOR MORE than 35 years Pressed Steel Tank Company engineers have been co-operating with manufacturers in the solution of their problems calling for the development or construction of shapes, shells and containers for gases, liquids and solids.

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Hackney MILWAUKEE **DEEP DRAWN SHAPES AND SHELLS**

130 tons, project 3928, E. I. du Pont de Nemours & Co., Carneys Point, N. J., to Belmont Iron Works, Eddystone, Pa.

120 tons, bottling plant, Coca Cola Co., New Haven, Conn., to Connecticut Steel Co., New Haven.

120 tons, dust-handling building, Aluminum Co. of America, Massena, N. Y., to Lackawanna Steel Construction Corp., Buffalo.

105 tons, lehr building floor, Pittsburgh Plate Glass Co., Ford City, Pa., to Pittsburgh Bridge & Iron Co., Pittsburgh.

100 tons, sheet piling, Los Angeles county, California, to Columbia Steel Co., San Francisco.

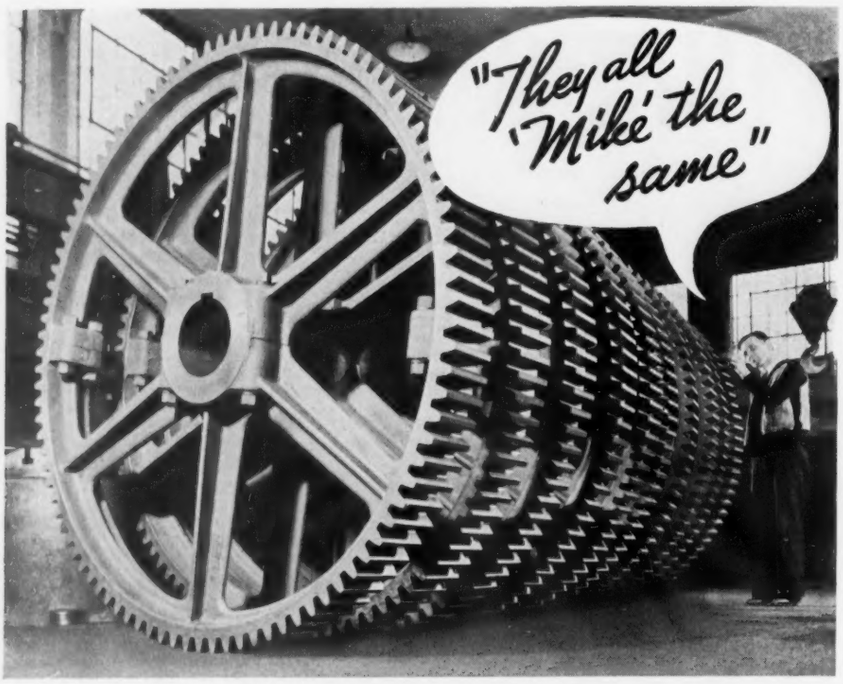
100 tons, bearing piles, Long Beach, Calif., to Bethlehem Steel Co., Los Angeles.

100 tons, bridges, Bedford county, Pennsylvania, project 13P3, Pennsylvania turnpike, to Bethlehem Steel Co., Bethlehem, Pa., through Walker Bros., Chambersburg, Pa.

Shape Contracts Pending

7000 tons, superstructure Rainbow Bridge, Niagara Falls, N. Y., amount to be cut to 5500 tons if bridge commission favors concrete approaches, Bethlehem Steel Co., Buffalo, low.

3500 tons, airport hangars and buildings, Gravelly Point, Va., for United States government.



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1200 tons, hangars, naval station, Kodiak, Alaska, United States navy.

781 tons, including 224 tons sheet piling and 207 tons bearing piles, improvement Los Angeles river between Downey road and Atlantic boulevard, Los Angeles; bids April 9.

610 tons, highway bridges for state: Pushamata county, 135 tons; Latimer and Letford counties, 125 tons; Cotton county, 350 tons.

570 tons, state bridge, PSC-4666, Cheektowaga, N. Y.; Bero Engineering & Construction Co., Buffalo, low.

532 tons, including 105 tons of sheet piling, for Los Angeles county, California; Columbia Steel Co., San Francisco, low.

520 tons, state bridge, PSC-6000, Rochester, N. Y.; C. P. Ward Inc., Rochester, low.

450 tons, tunnel supports, Continental Divide tunnel, station 618.39 to 698.39, specification 902; bids April 8 by bureau of reclamation, Denver, Colo.

400 tons, building, County Mutual Life Insurance building, Hartford, Conn.

340 tons, state bridge, PSC-5388, Alden, N. Y.; John Schultz Construction Co., Buffalo, low.

330 tons, cracking and combustion cases, Sun Oil Co., Marcus Hook, Pa.

265 tons, store building, Montgomery Ward & Co., Binghamton, N. Y.

200 tons, building, South Brooklyn Savings bank, Brooklyn, N. Y.

168 tons, highway bridge, Pulaski county, Arkansas; Ottinger Bros., Hinton, Okla., low on general contract.

140 tons, boiler house, Naugatuck Chemical Co., Naugatuck, Conn.

140 tons, school, Schenevus, N. Y., Central school district 1.

120 tons, school, Westmoreland, N. Y., board of education.

120 tons, crane runway, Schiavone & Bonomo Corp., Brooklyn, N. Y.

120 tons, nurses' home and hospital building, Morton hospital, Taunton, Mass.

120 tons, state bridge, PCS-5386, Lackawanna, N. Y.; Bero Engineering & Construction Co., Buffalo, low.

115 tons, building, Continental Can Co., Syracuse, N. Y.

110 tons, alterations to tower and WGN radio building, Chicago Tribune, Chicago.

110 tons, school, for St. Augustine's church, Larchmont, N. Y.

110 tons, building, Continental Can Co., Syracuse, N. Y.

100 tons, state bridge, Alleghany county, New York; Hornell Construction Co., Hornell, N. Y., low.

Reinforcing

Reinforcing Bar Prices, Page 83

Pittsburgh—The market is more active, with pending and prospective tonnage pointing to heavier awards with the approach of the spring building period. Early closing is expected on 7000 tons for army barracks at the Panama Canal, general contract for which has been placed. Also pending there is 6000 tons for officers' quarters. Awards are headed by 2500 tons for a Toledo, O., reservoir. Export inquiries are

more numerous than orders, though the latter are fair. Reinforcing bar prices vary widely, with the average for both billet and rail steel material about 1.90c, base.

Chicago—Total pending tonnage little changed and made up mostly of small jobs. Architects and engineers are busy on plans for new projects and warmer weather is confidently expected to increase tonnage on the market. Average price on billets is reported about 1.90, with some rail interests quoting 1.75 on their product. Chicago subway work is involving new foundations for a number of buildings along the subway route and considerable reinforcing is expected to be required.

Boston—Heavier inquiry and buying of reinforcing steel is accompanied by price weakness, concrete bars being frequently shaded $5 a ton. Awards include 1200 tons for a waterfront project, Boston, and an increased number of small lots, mostly for public works. Bridge and highway needs are small.

Philadelphia — Pending business has increased somewhat but is confined mostly to small jobs. Prices of billet steel bars to fabricators holds at 1.90c.

Seattle — Demand from private sources is slow. Rolling mills still have backlogs but operations have been reduced. Only business pending is for the reclamation bureau, about 2000 tons, bids in. Bids will be received at Grand Coulee, Wash., March 27, for construction of abutments for the Great Northern railway bridge over the Columbia river to be built by the reclamation bureau, which will require an unstated tonnage of reinforcing steel.

San Francisco—While awards of reinforcing steel bars were light, pending business is heavy, exceeding 23,000 tons. Bids are expected to be called for about April 29 for 4750 tons for the improvement of the Los Angeles river channel between Fourth street and Olympic boulevard, Los Angeles, and about April 25 for 350 tons for a dam on East Dullerton creek, Orange county, California, both for the United States engineer office. Awards aggregated 1360 tons, bringing the total to date to 24,787 tons as compared with 51,577 tons for the corresponding period in 1939.

Toronto, Ont.—Reinforcing steel awards show steady improvement with several thousand tons in prospect for early closing, spread over various sections of Canada. Included in prospective orders are 500 tons for subway at Montreal and 500 tons for bridge at St. Pierre, Que., for Canadian National Railways, 350 McGill street, Montreal.

Concrete Bars Compared

	Tons
Week ended March 23	**7,804**
Week ended March 16	**7,686**
Week ended March 9	**3,679**
This week, 1939	**9,113**
Weekly average, year, 1940	**7,256**
Weekly average, 1939	**9,197**
Weekly average, February	**5,457**
Total to date, 1939	**131,065**
Total to date, 1940	**87,070**

Includes awards of 100 tons or more.

Reinforcing Steel Awards

2500 tons, reservoir, contract P, Toledo, O., to Bethlehem Steel Co., Bethlehem, Pa., through Hausman Steel Co., Toledo.

1000 tons, flour mill and grain elevator at Humberstone, Ont., for Robin Hood Mills, Montreal, Que., to Steel Co. of Canada Ltd., Hamilton, Ont.

850 tons, Armistead Gardens housing project, Baltimore, to Bethlehem Steel Co., Bethlehem, Pa., through Dietrich Bros. Inc., Baltimore.

575 tons, building, Grocers' Finance Co.,

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ENGINEERING WORKS DIVISION
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Washington, to Sweet's Steel Co., Williamsport, Pa.

434 tons, subway section S-9-A, Chicago, to Republic Steel Corp., Cleveland.

400 tons, road work, Bedford county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.

375 tons, housing project, Detroit, to Truscon Steel Co., Youngstown, O.

360 tons, bottling plant, Seagram & Co., Louisville, Ky., to Pollak Steel Co., Cincinnati.

350 tons, grade separation, Winnetka, Ill., to Truscon Steel Co., Youngstown, O.

300 tons, storage tanks, Spencer-Kellogg Co., Decatur, Ill., to Missouri Rolling Mill Corp., St. Louis; Jones & Hettelsater, contractors.

300 tons, for R.C.A.F. magazine building at Debert, N. S., to Truscon Steel Co. of Canada, Montreal, Que.

300 tons, warehouse for Security Storage Co., 725 Portage street, Winnipeg, Man., to Cowin & Co., Winnipeg, Man.

300 tons, storage tanks, Decatur, Ill., to Missouri Rolling Mill Corp., St. Louis.

275 tons, bridge and highway project, Peabody-Danvers, Mass., to Bethlehem Steel Co.; M. DeMatteo Construction Co., Boston, general contractor.

250 tons, Pennsylvania turnpike, contract 5P3, Westmoreland county, Pennsylvania, to Bethlehem Steel Co., Bethlehem, Pa.

233 tons, bureau of reclamation, invitation 49,107-A, Clyde, Calif., to Judson Steel Corp., San Francisco.

192 tons, Washington state Kettle river bridge piers, to Bethlehem Steel Co., Seattle; S. S. Mullen, Seattle, general contractor.

185 tons, Hope street viaduct, Providence, R. I., to Concrete Steel Co., Boston.

170 tons, highway bridge, Jefferson county, Missouri, to Laclede Steel Co., St. Louis, through Odell & Riney, St. Louis, general contractors.

125 tons, auditorium, Rhode Island School of Design, Providence, to Bethlehem Steel Co., Bethlehem, Pa.; Turner Construction Co., Boston, general contractor.

100 tons, naval ammunition magazine, Oahu, T. H., to Bethlehem Steel Co., San Francisco.

Unstated tonnage, Parke-Davis animal house, Detroit, to Truscon Steel Co., Youngstown, O.

Reinforcing Steel Pending

4750 tons, improvement Los Angeles river channel, between Fourth street and Olympic boulevard, Los Angeles; bids about April 29.

2625 tons, bureau of reclamation, invitation 33,444-A, Coram, Calif.; bids March 27.

1050 tons, Rainbow Bridge, Niagara Falls, N. Y.; amounts to be cut to 460 tons if steel approaches are favored by bridge commission; subject to commission's approval McLain Construction Co., Buffalo, was low on the approach for the American side while Cameron & Thin, Welland, Ont., was low on the general contract for the Canadian approach.

680 tons, office building, Chesapeake & Potomac Telephone Co., Baltimore.

500 tons, addition to veterans administration facility, Sawtelle, Calif.; Soule Steel Co., Los Angeles, low.

401 tons, improvement Los Angeles river channel, between Downey road and Atlantic boulevard, Los Angeles; bids April 9.

350 tons, dam on East Fullerton creek, Orange county, California, for United States engineer office, Los Angeles; bids about April 29.

350 tons, public health service building, Fayette county, Kentucky; Fleischer Engineering & Construction Co., Buffalo, low.

345 tons, steam plant at Oleum, Calif., for Pacific Gas & Electric Co.; bids opened.

300 tons, housing projects 41 and 42, Lexington, Ky.; bids March 23.

280 tons, plant, Ladish Stoppenbach Malting Co., Milwaukee.

250 tons, smoke stack, Phelps-Dodge Corp., Douglas, Ariz.; bids in.

250 tons, quartermaster department, Fort Mason, Calif., for Alaska; Columbia Steel Co., San Francisco, low by $7 a ton.

247 tons, bureau of reclamation, invitation 30,799-A, La Pine, Oreg.; bids opened.

225 tons, plant, Ladish Drop Forge Co., Milwaukee.

224 tons, bridge over San Diego river, San Diego county, California, for state; bids April 4.

190 tons, technical service building, Moffett Field, Calif.; bids opened.

155 tons, conduit for water and power department, Los Angeles, spec. 3374; bids April 2.

130 tons, seaplane hangar, Floyd Bennett field, Brooklyn; bids in.

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125 tons, bureau of reclamation, invitation B-38,177-A, Kettle Falls, Wash.; bids opened.

109 tons, Piedmont avenue school, Oakland; Calif.; bids rejected.

Pig Iron

Pig Iron Prices, Page 84

Pittsburgh — Following several months in which pig iron consumers have depended principally on stocks and releases against previous orders, sellers look for moderate recovery in buying within a few more weeks. Inventories of foundries are relatively small, despite sizable additions last quarter. Radiator foundries are fairly busy, with a comparatively good outlook, but roll and ingot mold production has suffered from the decline in steelmaking.

Boston—Pig iron buying for second quarter delivery lags. Melters with low stocks continue to place small lots for prompt delivery while larger consumers, including most textile mill equipment builders, still have substantial stocks. Shipments to steelworks are light. Foundries supplying castings to the machine tool trade are the largest consumers and melting schedules by such shops are well maintained.

New York—Pig iron releases this month will prove better than February, although there is little new buying. Specifications are principally from machine tool and textile equipment builders and jobbers engaged in this type of work. It will probably be another few weeks, it is said, before soil pipe makers will materially increase their specificatons.

Philadelphia—Pig iron sellers report sales of a number of carload orders to small jobbing foundries. A second steel foundry is also in the market for several hundred tons. Generally the larger consumers are still well covered.

Buffalo—Releases from foundries are steady and producers estimate tonnage shipped in March will be roughly 10 per cent better than in February. Little tonnage will be carried over from substantial first quarter bookings. Inventories are well in line with healthy market conditions.

Cincinnati—Specifications for pig iron in March will exceed those of February by a small margin, to reflect expanded melt on automotive parts and in some seasonal lines.

St. Louis—Although few sales of pig iron, and those in small lots, have been reported since prices for second quarter were reaffirmed, there has been an increase in specifications against contracts. It is estimated that shipments so far in March are about 12 per cent ahead of the corresponding period in February. Melters have reduced inventories of pig iron considerably and further increases in shipping instructions is expected.

Toronto, Ont.—Merchant pig iron sales total about 2000 tons weekly with melters beginning to show more interest as production is stepped up under new war orders. Producers have opened books for second quarter but so far there has been no rush to cover although inquiries indicate buying on a larger scale than for first quarter. Production continues at record level with eight furnaces blowing. Prices are firm and unchanged.

Scrap

Scrap Prices, Page 86

Pittsburgh—Scrap prices continue to tend downward slightly in the face of quiet demand. No. 1 steel is off 25 cents at $16.50 to $17, with No. 2 steel down 75 cents at $15 to $15.50. Despite the slow market,

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They "see" what's going on in the soaking pits—

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Hays Combustion Instruments have set the standard for accuracy, dependability and stamina for 38 years. They are as well known in the steel mills and power plants of the country as a monkey wrench. They can be designed to meet practically any requirement concerning indicating, recording and controlling of combustion conditions. Hays Engineer-representatives are located in all the principal cities to help industry in the solution of its combustion problems. They will be glad to serve you. Write to 960 Eighth Ave., Michigan City, Indiana.

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Behind the Scenes with STEEL

Are We Good?

■ J. M. Cracraft Jr. of Moundsville, W. Va., tempts us to offer him a job as v. p. in charge of "tellin' 'em we're good." Into a nice letter he just wrote us, outlining some of the interesting things they're developing down there in his little plant, he plops this beautiful sentence: *Keeping abreast of all latest developments is part of our job, and our investment in a subscription to* STEEL *magazine is about the best we can make along this line.* The only thing that held us back was that word "about."

Or, Are We Good?

■ Another fellow who has a nice way of putting things is W. J. Tilley, president, of the Bristol Steel & Iron Works, Bristol, Va.-Tenn. To a request for a supply of STEEL's handy routing slips (furnished free, of course) he adds: *We feel this publication contains so much valuable information that we would like to have some established routing to insure it being available to every department head during each current week.*

Undecided

■ Incidentally, we weren't trying to be funny when we said Bristol, Va.-Tenn. We quickly rushed to the nearest Atlas when we got Mr. Tilley's letter and sure enough there was Bristol smack-dab on the border. Some day, some way, if it's the last thing we do, we're going down there and find out who's kidding who. And another place we plan to look into is Oblong, Ill.

Tales of New Castle

■ Speaking of towns, not long ago we happened to pass through the one-time "tin-plate center" of the world—New Castle, Pa., where ten years or so ago two plants were operating 72 tin mills with sheet bars furnished locally. Today the picture has changed and one steel plant with four stacks, two bessemer vessels, a bloomer and a sheet bar mill not long ago was leveled to the ground. The fellow riding along with us was born and raised in that neck of the woods and he remembered, back when he was a kid, a well-known iron master walked into the New Castle chamber of commerce and asked for a plot of land on which to build a mill. It seems he must have been turned down for he went on up the Shenango valley to the town of Sharon where he made the same proposition. It wasn't long before steel was rolling out of the new mill. Meanwhile, this man tore down his New Castle house and carted it up to Sharon where he rebuilt it on a spacious hillside site you now pass on the way to Youngstown. The man's name was John Stevenson Jr. The Sharon Sheet Steel Co. was taken over by the Union Steel Co. and later scrapped by the Corporation.

Still Coming

■ Apparently we had our eyes crossed last week. Mr. Clarence B. Bartlett's interesting article on the social security tax system is due for next week, but it's still worth waiting for.

Keerect

■ V. E. Slater of Cleveland Crane & Engr. shot the correct answer of 37.4 feet over the phone to us last Monday before the ink on his copy of STEEL was half-dry. And so he earned (along with the rest of those who passed) a copy of the Materials Handling booklet, and who could use one better?

Hic!

■ We haven't tried to work this yet but we like the whole idea: A drunk, while rowing a boat upstream, finishes off a bottle and tosses it overboard. He continues rowing for 15 minutes when the horrible thought occurs to him that there was still a drink left in it. So he turns around and finally fishes out the bottle one mile below the place where he threw it out. The ticklish question is how fast did the drunk row and how fast was the river flowing?

SHRDLU

scrap is not plentiful and sellers would encounter difficulty in attempting to pick up large lots at the lower of current ranges on a number of grades. New offerings by railroads are commencing to appear. The Pennsylvania's list, closing April 3, involves about 23,000 net tons, including 6500 tons of No. 1 steel and 2000 tons each of scrap rails and iron wheels.

Cleveland—Little business is being done in scrap and shipments are routine with prices nominally unchanged. Dealers are holding stocks for the rise.

Chicago—Last week mill purchases were made at $15.75 and $15.50, with the latter figure marking the most recent transaction. No. 1 heavy melting now is quoted $15 to $15.50, with dealer-broker trading within that range Other heavy melting grades also are 50 cents lower than the previous week, but the list as a whole is substantially unchanged.

Boston—Buying of foundry grades of scrap is light with consumers and dealers still apart as to price. Depending on freight costs, No. 1 cast ranges from $16.50 to $17.50 delivered. Prices on material for eastern Pennsylvania shipment are slightly firmer, an exception being turnings, which are down 50 cents.

New York—Scrap prices have leveled off and for the most part are unchanged, with heavy breakable cast slightly firmer. Domestic buying is light with steelworks and foundries taking scattered shipments but buying little. Export activity depends on available ships.

Philadelphia—Despite a comparatively low rate of operation district mills are not holding up scrap shipments and inventories in two or three directions are substantial. The situation justifies no reduction in heavy melting steel, which has been unchanged for weeks. Heavy cast for steelmill use is strong.

Buffalo—Dealers content themselves with shipping against old orders as buying interest at current levels has waned. Dealers refuse to recognize lower bids of consumers. Yards are being prepared for the rural movement of scrap which is due to get under way shortly.

Detroit—Leading scrap consumer has held up all shipments because of over supply, which has had a depressing effect. Recent sale of a large tonnage of compressed sheets was above current level, because of special considerations. While the outlook is not bright prices are expected to hold at about the present level.

Cincinnati—Routine activities occupy iron and steel scrap dealers in the absence of active mill purchasing. The price decline has been halted but dealers avoid further

building of yard stocks. Items on recent railroad lists were in fair demand although bids generally were lower than in February. Dealers hold quotations unchanged.

St. Louis—Dealer buying to cover short interest makes up practically all present scrap activity. Mills have sufficient reserves for present operations. Better weather has increased country receipts. Prices are soft. No. 1 heavy melting steel is down 25 cents and No. 2 is 50 cents lower.

Toronto, Ont.—General drying up of scrap offerings has resulted in some anxiety regarding future supplies of heavy melting and most other lines of steel scrap. Local dealers state there is little steel scrap in the Toronto area and auto wreckers are practically cleaned out. However, there has been no decline in shipments to consumers as dealers' yards are sufficiently well stocked to meet spot needs. No.

San Francisco—Due to the fact that no new orders for export material for Japan have been received, prices in the domestic market show a further decrease and No. 1 heavy melting steel, f.o.b. cars, metropolitan district of San Francisco and Los Angeles are now quoted at $11.50 to $12 a net ton, with No. 2 at $10.50 to $11 a net ton and compressed sheets at $9 to $9.50 a net ton. Turnings and borings hold at $5 to $5.50 a net ton. Coast open-hearth producers continue to buy only for replacement. Those in close touch with the situation are of the opinion that further reductions will occur around the first of April.

Warehouse

Warehouse Prices, Page 85

Pittsburgh—Business has tended downward slightly, and March gives little indication of exceeding February volume. Prices are unchanged following recent revisions in alloy bars.

Chicago—Orders last week were improved in number, but dollar volume is about the same as for the same period of February. Last half of month is expected to be better than the first half, as so far improvement has not been up to earlier anticipations.

New York—Although representative jobbers are holding to listed price schedules, widespread shading is prevalent among smaller warehouse distributors who became overloaded. Seeking cash, they are lowering inventories at concessions.

Buffalo—Distributors believe the recent recession in buying is over and March volume shows definite signs of exceeding February. Sales are also considerably ahead of year ago. Buying is diversified, although heavy lines continue to lag. No further adjustments have been made in prices.

Philadelphia—Orders this month are practically equal to the February daily average. Some seasonal rise is indicated for the next few weeks. Prices are steady.

Cincinnati—Recent improvement in warehouse sales continues. Orders from industrial users are generally heavier. Calls for building materials are infrequent although inquiries are somewhat better in anticipation of spring needs.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 83

Bolt and nut producers are issuing second quarter contracts, with prices unchanged from current levels. While prices have been without influence on demand lately, specifications have shown definite improvement so far this month. March apparently will be the best month of the quarter. Curtailment in stocks acquired previously by consumers and distributors has been a factor in stimulating specifications, aided also by gains in consumption in some directions.

Iron Ore

Iron Ore Prices, Page 86

Cleveland—February consumption of Lake Superior iron ore totaled 4,241,839 gross tons, compared with 5,289,308 tons in January, a shrinkage of 1,047,469 tons, 19 per cent. In February, 1939, consumption was

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2,852,540 tons. Cumulative consumption to March 1, 1940, was 9,531,147 tons, compared with 5,779,246 tons in the same period last year. Stocks at furnaces and on Lake Erie docks were reduced 4,222,373 tons during the month and on March 1 were 2,873,179 tons less than a year ago. Blast furnace stacks in blast Feb. 29 numbered 122, compared with 142 a month previous and 93 a year ago. Comparison of stocks follows:

	At Furnaces*	On Docks	Total*
March 1	22,086,676	3,880,198	25,966,874
Month ago	25,901,496	4,287,751	30,189,247
Year ago	23,912,344	4,927,709	28,840,053

*Includes tonnages at eastern plants using only small proportion of lake ore.

Steel in Europe

Foreign Steel Prices, Page 85

London—(*By Cable*)—Supplies of steel will be completely rationed in Great Britain from April 1. Demand continues to expand and deliveries are further extended. Makers are reluctant to accept new orders. Shipyards are extremely busy. Exports of lighter steel products are expanding slightly but tin plate export demand is slower.

Belgium and Luxemburg report steel producers are well booked ahead on home and export orders. Orders for railroad rolling stock for export have been booked recently. Larger tonnages of steel are being exported to France.

Nonferrous Metals

New York—Price sentiment in major nonferrous metal markets recovered somewhat last week from the pronounced weakness at the opening. Weakness had been generated by peace rumors over the March 16 weekend while the return of strength accompanied the resumption of more warlike activity abroad.

Copper — Custom smelters renewed on Monday their policy of not posting publicly any electrolytic copper price, reduced on Tuesday the price of casting copper ¼-cent to the basis of 11.00c, f.o.b. refinery, and lowered their bids for red metal scrap ¼-cent to the basis of 9.75c for No. 1 heavy copper. They competed actively with resellers for the light volume of business done on the outside market at around 11.25c to 11.37½c com-

Nonferrous Metal Prices

Mar.	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
16	11.50	11.50	11.25	47.25	47.25	5.25	5.10	5.75	20.00	14.00	35.00
18	11.50	11.50	11.25	46.50	46.50	5.25	5.10	5.75	20.00	14.00	35.00
19	11.50	11.50	11.00	46.50	46.50	5.15	5.00	5.75	20.00	14.00	35.00
20	11.50	11.50	11.00	46.62½	46.62½	5.15	5.00	5.75	20.00	14.00	35.00
21	11.50	11.50	11.00	46.75	46.75	5.15	5.00	5.75	20.00	14.00	35.00
22	Holiday										

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 11.50c Conn. copper

Sheets

Yellow brass (high)	18.31
Copper, hot rolled	20.12
Lead, cut to jobbers	8.50
Zinc, 100 lb. base	11.00

Tubes

High yellow brass	21.06
Seamless copper	20.62

Rods

High yellow brass	14.26
Copper, hot rolled	16.62

Anodes

Copper, untrimmed	17.37

Wire

Yellow brass (high)	18.56

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	7.00-7.25
Cleveland	8.00-8.25
Chicago	7.50-7.75
St. Louis	7.75-8.25

Heavy Copper and Wire

New York, No. 1	8.75-9.00
Cleveland, No. 1	9.00-9.25
Chicago, No. 1	8.75-9.00
St. Louis	8.75-9.25

Composition Brass Turnings

New York	6.75-7.00

Light Copper

New York	6.75-7.00
Cleveland	7.00-7.25
Chicago	6.75-7.00
St. Louis	6.75-7.00

Light Brass

Cleveland	4.00-4.25
Chicago	4.25-4.50
St. Louis	4.50-4.75

Lead

New York	4.40-4.65
Cleveland	3.90-4.15
Chicago	4.15-4.40
St. Louis	4.00-4.25

Zinc

New York	3.00-3.25
Cleveland	2.75-3.00
St. Louis	3.25-3.50

Aluminum

Mixed, cast, Cleveland	8.75-9.00
Borings, Cleveland	6.75-7.25
Clips, soft, Cleveland	15.75-16.00
Misc. cast, St. Louis	8.75-9.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads	11.75
Standard No. 12 aluminum	14.50-14.75

pared with the mine producers' price of 11.50c, Connecticut. Export demand was dull with prices holding at about 11.40c, f.a.s. New York. Actual copper consumption amounted to 66,649 tons in February, compared with 82,494 in January.

Lead—Prices declined 10 points on Tuesday to the basis of 5.00c, East St. Louis. This move had been unexpected and failed to stimulate buying.

Zinc—Activity continued quiet with prices steady on the basis of 5.75c, East St. Louis, for prime western. Galvanized sheet output has declined further to about 51 per cent of capacity.

Tin—Prices dropped sharply on Monday to 46.50c from 47.25c and then rose gradually to the closing level of 46.75c. Fluctuations reflected trends in London and Singapore as well as war developments.

Antimony—Demand again was confined to caselots with only an occasional carlot booked. Prices held at 14.00c, New York, for American spot and nominally 16.50c, duty paid New York, for Chinese spot.

Westinghouse Employes Receive 8 Per Cent Bonus

■ About 49,500 employes of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., will have salaries and wages adjusted upward 8 per cent from base rate this month. Company's wage and salary plan establishes compensation each month in proportion to average earnings of company in preceding three months.

Net profits on which compensation is based totaled $3,833,564 to Feb. 29, of which December earnings were $1,598,595; January, $958,738; February, $1,276,231. In December employes received a 10 per cent bonus; in January, 12 per cent.

Ferroalloys

Ferroalloy Prices, Page 84

New York—Ferroalloy shipments this month will probably be on a parity with February, leading sellers declare. The trend in steel operations has gone down but not sufficiently, it is believed, to offset the influence of a longer month in March and some necessary replacements by consumers where stocks laid in last year had dropped to a low point.

Ferromanganese is steady at $100, duty paid, eastern seaboard, and domestic spiegeleisen, 19 to 21 per cent, at $32, Palmerton, Pa., and 26 to 28 per cent at $39.50.

Coke Oven By-Products

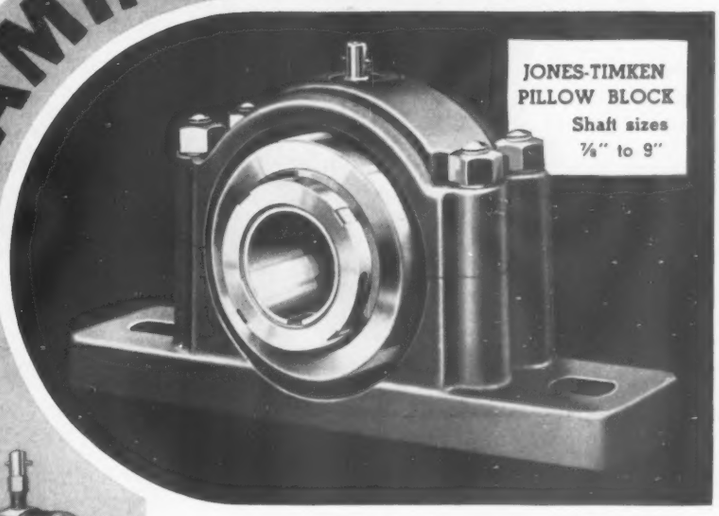
Coke By-Product Prices, Page 83

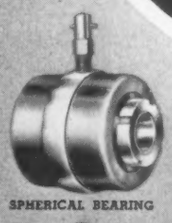
New York—Demand for distillates is less active, but buying by lacquer makers, influenced by the automobile industry, is substantially maintained. Production is lower and on some items is about 60 per cent below the peak of last fall. Prices are unchanged. The usual seasonal improvement in naphthalene is under way, both to jobbers and the chemical trade. Phenol demand is steady with the plastic industry the leading consumer. Shipments of sulphate of ammonia are behind schedule with supplies short, releases by the fertilizer trade leading. Prices are unchanged.

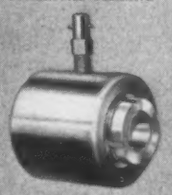
Equipment

New York—Machine tool orders during March are fully up to the February rate and in some instances slightly heavier. New business is ahead of shipments and most backlogs are being built up

STAMINA, INC.




SPHERICAL BEARING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rather than lowered despite capacity operations and overtime by assembly shops. While orders from the navy and government shops are heavy, general private industrial demand is maintained and some sections which have been trailing are buying more equipment, notably western New York. Deliveries on most lines are further extended and some orders are being taken for 13 months shipment. More orders are booked at fixed prices rather than open quotations subject to adjustment at time of shipment. Considerable volume is held up by the aircraft industry, resulting from uncertainty as to the type of plane being sought by the British and French. Aircraft builders are also reluctant to make further productive expansions unless guaranteed such expenditures by the allied governments.

Boston—Harnischfeger Corp., Milwaukee, has been awarded the contract for a small bridge crane, navy yard, Portsmouth, N. H. at $5624 while a similar unit for the yard, Charleston, S. C., has been placed with Euclid Crane & Hoist Co., Euclid O., at $8327.

Chicago—Machinery sales have been spotty, but first half of the month has been fairly good. Sellers seem slightly less optimistic, as some manufacturing plants are hesitating to buy needs, purportedly because their present bookings do not support operations. Deliveries on some machine tools are not as prompt, especially in lathes and millers. Considerable export interest is noted. Orders from surrounding territory are only fair, bulk of demand reported coming from sources farther east, although city buying in Chicago is good. Inquiries are lighter in volume and present rate described as fair. Possibility is seen, however, March will end up better than February in totals booked.

Seattle—Machinery and equipment are moving in larger volume. Electrical road building and water system items are in leading demand. General Electric Co. is low to reclamation bureau at $247,150 for furnishing transformers for the Coulee power plant. United States engineer has awarded contracts to General Electric Co., low at $180,595, for transformers, and $150,240 for circuit breakers, and to Pacific Electric Mfg. Co., San Francisco, $39,856 for circuit breakers, all for Bonneville power house. Bids are called April 3 for three 400-kva transformers for Astoria, and April 12 for nine 1000-kva transformers for Ellensburg, Ampere and McMinnville, Wash. Fritz Ziebarth, Long Beach, Calif., is low to Bonneville at $163,460 for construction of 22-mile power line from the dam to Hood River, Oreg.

Denver—Cleveland Crane & Engineering Co., Wickliffe, O., at $50,975, is low on a 200-ton traveling crane for the Parker dam power project, California-Arizona, spec. 1329-D.

Construction and Enterprise

Pennsylvania

ALLENTOWN, PA.—Lehigh Portland Cement Co., 718 Hamilton street, J. M. Young, manager, is improving its plant and equipment at cost of about $100,000.

OIL CITY, PA.—Keystone Public Service Co. has approved plans for an addition to its steam-electric power plant, including a 5000-kilowatt turbogenerator and accessories, boiler and other equipment, to cost $250,000.

PHILADELPHIA — Freihofer Baking Co., Indiana avenue and Twenty-seventh street, will install power equipment, traveling ovens, conveyors and other equipment, to cost about $100,000.

PHILADELPHIA — Pennsylvania Salt Mfg. Co., 100 Widener building, Philadelphia, has bought 50 acres fronting Delaware river at Cornwells Heights as site for new plant to cost about $2,000,000.

PITTSBURGH—Standard Can Co. has been organized with $50,000 capital to manufacture steel pails and containers for paint, oil and similar products. Plant will be established on Columbus avenue. P. W. Hatfield is president and M. Moss secretary-treasurer. Production will start about May 1.

READING, PA.—Metropolitan Edison Co., Reading, will build extensions to its power plants at Reading and Lebanon, Pa., installing turbogenerator units with boilers and auxiliaries as part of 1940 expansion to cost about $3,000,000.

ST. MARYS, PA.—Stackpole Carbon Co., H. C. Stackpole, president, 201 Tannery street, is building 1-story factory units 60 x 100, 36 x 50 and 40 x 50 feet, to cost about $45,000.

Connecticut

PORTLAND, CONN.—Robert Gair Co. Inc., 155 East Forty-fourth street, New York, has plans by Mylchreest & Reynolds, 238 Palm street, Hartford, Conn., for a paper carton plant to cost $40,000.

STAMFORD, CONN. — Connecticut Power Co., New London, Conn., has plans to expand and improve its steam-electric power plant at Stamford, including installation of a 25,000-kw turbine generating unit with high-pressure boilers and auxiliary equipment, to cost about $3,000,000.

WATERBURY, CONN. — Connecticut Light & Power Co., Hartford, Conn., will install a 15,000-kva condenser unit at Waterbury and a new dock and coal-handling equipment at Devon, Conn., as part of a 1940 expansion plan to cost $2,600,000.

Massachusetts

NORTHAMPTON, MASS.—Massachusetts department of public works, J. W. Beal, commissioner, 100 Nashua street, Boston, will build a concrete and steel grade crossing to cost about $100,000.

New Jersey

BAYONNE, N. J.—Railroad General

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Buffalo Detroit New York Philadelphia Boston

Cable Corp., 243 West First street, has plans by H. K. Ferguson Co., 25 West Forty-third street, New York, for a high-voltage electrical laboratory building at First street and Avenue A.

BELLEVILLE, N. J.—Andrew Jergens Co., 2535 Spring Grove avenue, Cincinnati, plans a pharmaceutical laboratory and boiler house to cost $1,000,000, at Belleville. Tiltig & Lea, West Sixth street, Cincinnati, are architects.

BENDIX, N. J.—Pioneer Instrument Corp., division of Bendix Aviation Corp., 30 Rockefeller Plaza, New York, is adding to various plant buildings, cost to be about $125,000.

New York

ALBANY, N. Y.—Simmons Machine Tool Corp., Broadway, Menads, N. Y., (Albany suburb) will build a 1-story plant, 152 x 365 feet, costing $40,000.

ELMIRA, N. Y.—Remington-Rand Inc. is taking bids on several additions to its plant at Elmira.

FARMINGDALE, N. Y.—Ranger Engineering Co., Conklin street, is having plans drawn by Albert Kahn Inc., New Center building, Detroit, for a 2-story plant and office building.

JAMESVILLE, N. Y.—Alpha Portland Cement Co. is building a grinding mill 45 x 60 x 80 feet, costing about $40,000. W. J. Burns Construction Co., Heffernan building, Syracuse, N. Y., contractor.

NEW YORK—General Aniline Works Inc., 435 Hudson street, New York, is building a 2-story addition to its plant at Grasseli, N. J.

Ohio

CLEVELAND—Bee & Bee Mfg. Co., 2403 St. Clair avenue, manufacturer of pressed steel restaurant equipment, is considering plans for an addition to its plant.

CLEVELAND—Beer Systems Inc., recently formed to manufacture beer-dispensing equipment under patents of Herman Harr, Newark, N. J., is having its product manufactured by Riester & Thesmacher Co., 1526 West Twenty-fifth street.

CLEVELAND—Mertes Mfg. Co. has been formed by W. L. Mertes, C. A. Mertes and Theodore Mertes, to manufacture tube shells for radios, flashlight battery parts and other extruded zinc products. Headquarters are at 10910 Berea road, Cleveland.

COLUMBUS, O.—Ike Topper Structural Steel Co., I. L. Goldberg, president, 555 Cleveland avenue, has bought 6-acre tract at 2100 South High street, 224 x 1024 feet, containing two-story factory building 350 feet long.

MASSILLON, O.—Art Stainless Steel Products Co. has been incorporated with 200 shares no par value by V. H. Meyer, Meyer L. Burrell and Richard B. Hardman, Ohio Merchants Bank building, Massillon, O.

NEW PHILADELPHIA, O. — Phila-National Co. has been formed by local interests to manufacture steel equipment for stores and other fabricated sheet metal products.

Michigan

DETROIT—Craftsman Tool & Die Co. has been incorporated with $10,000 capital to manufacture and sell tools, by John Johansen, 705 Piquette avenue, Detroit.

DETROIT—J. A. Utley Co. has been awarded contract for rear axle plant and tunnel at Buick motor works of General Motors Corp., at Flint, Mich. Albert Kahn Inc., Detroit, is architect.

DETROIT—Monroe King Stoker Co., 20 West Fourth street, has been incorporated with $50,000 capital to manufacture mechanical stokers, by Lloyd A. Knapp, 218 East Willow street, Detroit.

DETROIT—H-T-S Engineering Corp., 1349 East Milwaukee avenue, has been incorporated to manufacture internal combustion engines, with 10,000 shares no par value, by Ray Harroun, Amadore apartments, Saginaw, Mich.

DETROIT—United Steel Sales Inc., 4-114 General Motors building, Detroit, has been incorporated with $50,000 capital to deal in steel and iron, by Samuel B. Solomon, 18255 Fairfield street, Detroit.

DETROIT—Model Sheet Metal Corp. has been incorporated with $5000 capital to conduct a general sheet metal business, by W. E. Bragdon, 1545 East McNichols road, Detroit.

Maryland

BALTIMORE—Chesapeake & Potomac Telephone Co., L. M. Griffin, general manager, has let contract to Cummins Construction Corp., 803 Cathedral street, for a building at St. Paul and Pleasant

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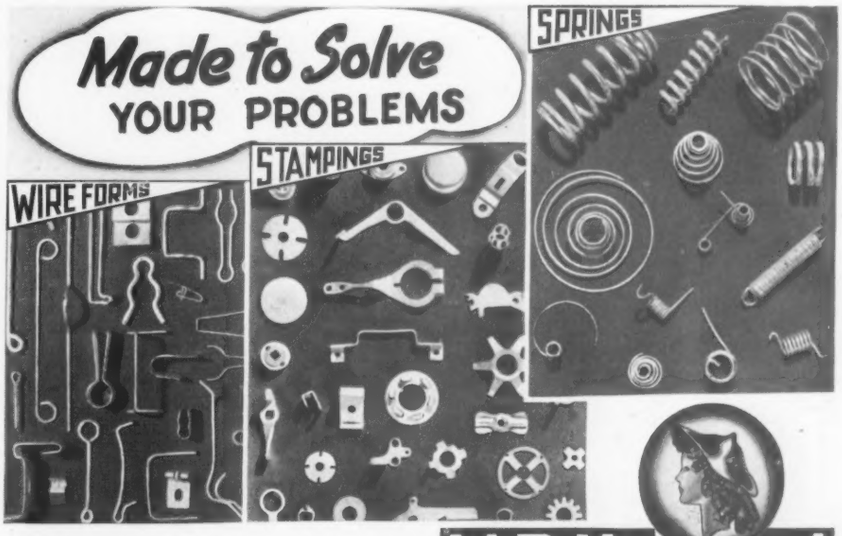

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District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will open bids April 10, schedule 1020, for two double-wheel, motor-driven combined wet and dry floor-type grinders for delivery at Mare Island, Calif.; March 26, schedule 1044, for one motor-driven precision bench type milling machine for delivery f.a.s. vessel at New York, Philadelphia or Norfolk, Va.; April 2, schedule 1059, two motor-driven toolmaker's precision lathes for delivery at Norfolk, Va.; March 29, schedule 1073, for 200 type A light-weight portable electric drills for delivery at Philadelphia.

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Missouri

ST. LOUIS—Carter Carburetor Co., 2820 North Spring avenue, is building plant addition. L. O. Stocker Co., Arcade building, is contractor.

ST. LOUIS—Emerson Electric Mfg. Co., 1824 Washington avenue, has let general contract to Widmer Engineering Co., Arcade building, for steel and brick 1-story plant.

WAVERLEY, MO.—City, T. E. Guenther, mayor, will vote April 2 on $43,000 bond issue to finance, with WPA aid, waterworks and sewer system to cost about $100,000. Harrington & Cortelyou, Dwight building, Kansas City, Mo., are consulting engineers.

Arkansas

LITTLE ROCK, ARK.—Independent Metal & Equipment Co. has been incorporated with 100 shares of $100 each and $4000 paid-in capital by S. L. Shepherd and A. E. Queen.

Texas

DALLAS, TEX.—American Iron & Metals Inc., capital $10,000, has been incorporated to conduct a scrap business, by Harry I. Freedman, Ray Simpson Jr. and Blanche Michaelson.

HOUSTON, TEX.—Kelley Mfg. Co., capital $300,000, has been incorporated to manufacture steel and iron products, by Ed. W. Kelley and H. W. Brown.

ORANGE, TEX.—Consolidated Steel Corp. of Texas has been incorporated to deal in steel and iron, with $100,000 capital, by A. D. Moore, Maurice Teddlie and M. W. McClendon.

SAN ANTONIO, TEX.—National Aircraft Corp., Gillette boulevard, John E. Hughes chief draftsman, plans two factory additions, 150 x 300 feet and 80 x 200 feet. Company headquarters Trinity Life building, Fort Worth, Tex., A. P. Barrett, president.

Nebraska

AUBURN, NEBR.—Merrick county rural public power district has been granted authority by state railway commission to build 109 miles of rural transmission lines in Merrick county.

LEXINGTON, NEBR.—REA has approved contract to Crawford Electric Co., North Platte, Nebr., by Dawson county public power district, Thomas C. Guilfoyle, superintendent, for 272 miles rural transmission lines to serve about 600 customers. Raymond H. Reed, Abilene, Kans., is consulting engineer.

NORTH PLATTE, NEBR.—City, S. W. Throckmorton, clerk, has approved plans and will take bids early in April for a water pumping plant costing $19,000. Is considering sewage disposal plant to cost about $150,000. Richard F. Nosky is city engineer.

WAYNE, NEBR.—Wayne county rural public power district has applied to state railway commission for authority to build 198 miles of rural transmission lines in Wayne, Dixon, Stanton, Pierce and Thurston counties.

Iowa

ATLANTIC, IOWA—Bids about April 15 to George Alexander, city clerk, for sewage disposal plant to cost about $125,000, with WPA aid. Buell & Winter Engineering Co., 508 Insurance Exchange building, Sioux City, Iowa, is consulting engineer.

CEDAR FALLS, IOWA—City, H. B. Philpot, clerk, has plans for hydroelectric plant with overhead crane and two hydraulic turbines. Clark Streeter is city engineer.

ESTHERVILLE, IOWA — Estherville Electric Light Co., has a $110,000 bond issue to finance purchase of new generating equipment to furnish power for about 420 miles of REA lines in three adjoining counties.

JEFFERSON, IOWA—Greene county rural electric co-operative, Clifford F. Unz, superintendent, has obtained REA approval of contract to Hoak Construction Co., 626 Sixty-third street, Des Moines, Iowa, for 224 miles rural transmission lines to serve 460 customers. Kenneth R. Brown, 802 Valley Bank building, Des Moines, is consulting engineer.

McGREGOR, IOWA—Bids to April 10 to W. R. Stone, village clerk, for power plant, including two diesel engines 650 to 750 horsepower, generators and auxiliaries and distribution system.

California

LOS ANGELES—Plant of Hollister Coil Spring Mfg. Co., 5413 McKinley avenue, damaged by fire, loss estimated $50,000.

Washington

RITZVILLE, WASH. — Electric Contracting Co., Seattle is low for construction of 268 miles of power distribution lines for Big Bend electric co-operative, contract awaiting REA approval.

SEATTLE—Dulien Steel Products Inc., 414 First avenue south, has increased capital from $50,000 to $100,000.

SEATTLE—Local officials of Shell Oil Co., W. T. Shaw, manager, has recommended $500,000 improvement and expansion program at water terminal, including additional steel storage tanks and fire wall.

Canada

NEW WESTMINSTER, B. C.—British Columbia Mfg. Co., J. H. McDonald, president, will rebuild mill and veneer plants recently burned with loss of $250,000.

ST. BONIFACE, MAN.—North Star Oil Co. Ltd., Scott block, Winnipeg, Man., has awarded contract to Born Engineering Co., Tulsa, Okla., for cracking unit, tower and lines, as part of $300,000 expansion program here.

LINDSAY, ONT.—W. R. Campbell, chairman war supply board, Ottawa, Ont., is receiving tenders for construction of seven metal buildings at the dominion arsenal here.

PETROLIA, ONT.—Canadian Oil Cos. Ltd., John Irwin, president, will remodel topping and cracking units in line with Dubbe method, as part of $500,000 improvement program. Universal Oil Products Co., Chicago, will supervise program.

ST. CATHARINES, ONT.—McKinnon Industries Ltd., manufacturer of steel products, Ontario street, will build an addition and install new equipment.

WESTON, ONT.—Massey-Harris Co. Ltd., Toronto, Ont., is taking bids for rehabilitation and addition to plant here, which has been closed several years.

MONTREAL, QUE.—Two additional stories will be built on the three-story Marine building, office headquarters of Marine Industries Ltd., Montreal and Sorel, Que. Cost about $30,000.

QUEBEC, QUE.—Bids are being received by T. D. Bouchard, minister of provincial department of roads, for machinery and equipment costing $500,000.

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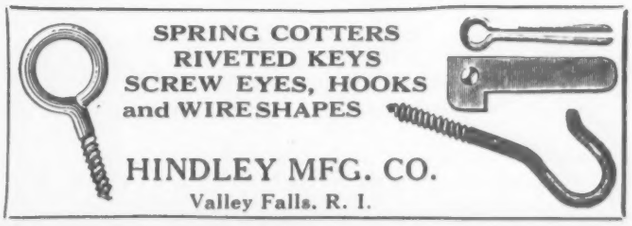

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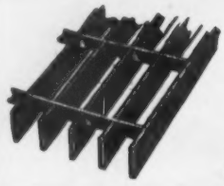

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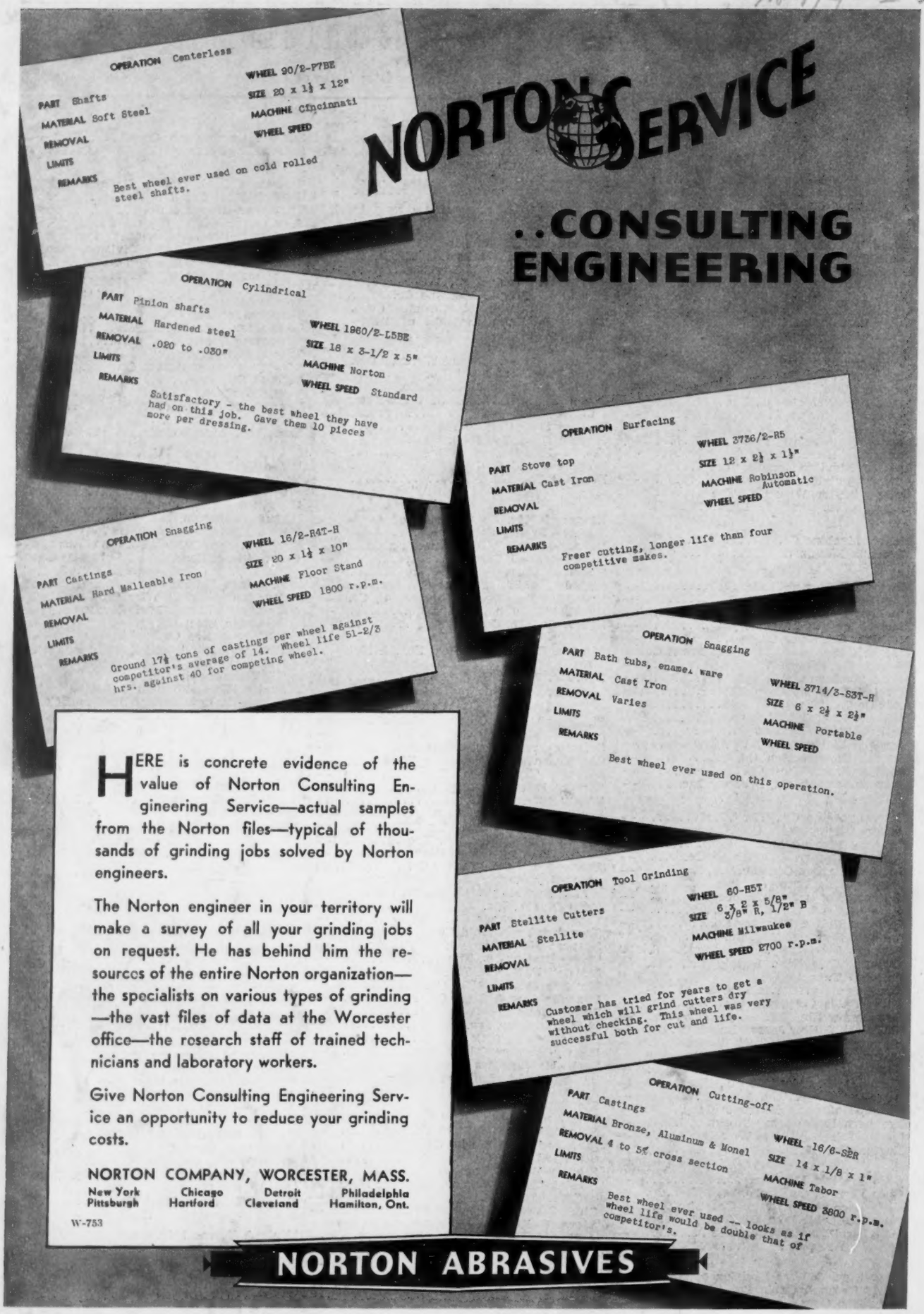
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OPERATION Centerless
PART Shafts
MATERIAL Soft Steel
REMOVAL
LIMITS
REMARKS Best wheel ever used on cold rolled steel shafts.
WHEEL 90/2-P7BE
SIZE 20 x 1½ x 12"
MACHINE Cincinnati
WHEEL SPEED
OPERATION Cylindrical
PART Pinion shafts
MATERIAL Hardened steel
REMOVAL .020 to .030"
LIMITS
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WHEEL SPEED Standard
OPERATION Surfacing
PART Stove top
MATERIAL Cast Iron
REMOVAL
LIMITS
REMARKS Freer cutting, longer life than four competitive makes.
WHEEL 3736/2-R5
SIZE 12 x 2½ x 1½"
MACHINE Robinson Automatic
WHEEL SPEED
OPERATION Snagging
PART Castings
MATERIAL Hard Malleable Iron
REMOVAL
LIMITS
REMARKS Ground 17½ tons of castings per wheel against competitor's average of 14. Wheel life 51-2/3 hrs. against 40 for competing wheel.
WHEEL 16/2-R4T-H
SIZE 20 x 1½ x 10"
MACHINE Floor Stand
WHEEL SPEED 1800 r.p.m.
OPERATION Snagging
PART Bath tubs, enamel ware
MATERIAL Cast Iron
REMOVAL Varies
LIMITS
REMARKS Best wheel ever used on this operation.
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MACHINE Portable
WHEEL SPEED
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PART Stellite Cutters
MATERIAL Stellite
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LIMITS
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WHEEL 60-H5T
SIZE 6 x 2 x 5/8" 3/8" R, 1/2" B
MACHINE Milwaukee
WHEEL SPEED 2700 r.p.m.
OPERATION Cutting-off
PART Castings
MATERIAL Bronze, Aluminum & Monel
REMOVAL 4 to 5% cross section
LIMITS
REMARKS Best wheel ever used -- looks as if wheel life would be double that of competitor's.
WHEEL 16/6-SER
SIZE 14 x 1/8 x 1"
MACHINE Tabor
WHEEL SPEED 3800 r.p.m.
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Reader COMMENTS

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

No Mystery in Welding

To the Editor:

Arc welding has too many doctors. An operation which is perfectly natural, very simple and very easily accomplished, has largely been changed in the minds of the public to an art which takes on the mystery of voodooism with an admixture of the art of the medicine man.

The public is beginning to think that the welding operator is a cross between a miracle man and a professional musician. This opinion is groundless. The only thing that a welding operator can do is to hold the end of an electrode at a certain distance above the deposited metal and advance it along the seam to be welded at a certain speed. There is nothing more that is involved in this operation. It is neither complicated nor difficult.

As a matter of fact, with proper electrode, proper setting of the welding machine and proper preparation of the work, it is practically impossible to make a weld which will not stand up in service without having it so evident to the inspector that he would immediately reject it. It is possible to have defects in the steel that cannot be seen which will make a steel structure dangerous. It is impossible, however, to make a weld on that structure which is dangerous without it being obvious to anyone looking at the weld.

The reason we hear so much about the necessity of skill and care in welding is largely due to the fact that the operation itself is so simple that it is difficult to find much about it to discuss in papers, lectures and statements. Therefore, many of these eccentricities which are volubly discussed in magazine articles, lectures and statements, consist of theoretical possibilities which exist only in the minds of the lecturers and seldom exist in reality.

It is time that we got away from trying to make this very simple operation mysterious. It is time that we recognize the fact that the metal deposited by the shielded arc electrode is definitely better than the parent metal it is joining. It is time we recognize that there has never been a failure on an insured pressure vessel made by the shielded arc process. It is time we recognize that in the usual design if only half a weld is made it will withstand all of the normal requirements of the structure.

It is time we recognize that failures never exist in welds which are made by the methods recommended by any reliable manufacturer. It is time we recognize that there is no mystery in welding and that making a welded joint is far more simple than making a riveted joint and more simple than making the steel which is joined together by this process. It is time we recognize that to spend time, money and attention in removing the least possible flaw from the deposited metal is silly in the light of the obvious flaws which must occur in the parent metal. A factor of safety is used to guard against these flaws. That is more than is needed in any commercial weld.

When we do recognize these facts we will have done two things: First, we will have given the green light to one of the most economical processes now known for the production of many structures; secondly, we will have removed one of the fears which the uninitiated have developed regarding a perfectly normal manufacturing operation.

J. F. LINCOLN
President
The Lincoln Electric Co.,
Cleveland

Capital Is Mainspring

To the Editor:

It cannot be reasonably expected that industry will maintain an equilibrium, or speed up production while governments are encouraged to emasculate private wealth and destroy profits by excessive taxation, legislative restrictions and attempts at management.

Overflowing reservoirs of capital supply the funds to blaze the trail of innumerable new speculative enterprises, also to develop new fields of research and invention. These create an increase in the demand for labor and lead to higher prices paid for labor.

While it is true that labor and productive machinery create wealth, they can function continuously only when employed for profit by those who can provide in advance abundant capital to keep them at work.

When encouraged in the opportunity of earning alluring profitable returns, capital will take risk of firing up more boilers and generating more steam for expected expansion.

Rebellion, disloyalty, strikes and violence restrict labor's opportunity of obtaining work, destroying the employer's incentive and driving available capital into hiding places for safety.

Sufficiently encouraged, capital will always keep moving to finance the production, sales, advertising and purchase on long terms of an endless number of commodities to supply the greatest potential market the world has ever known. This will increase the velocity of money circulation, can end depressions, solve the problem of unemployment, and keep prosperity normal.

LIONEL M. STERN
President,
Colonial Iron Works Co.,
Cleveland

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